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ABSTRACT

This curriculum guide provides instructional materials for a 10-unit secondary-level science-based nutrition course. Each unit contains some or all of the following components: a summary sheet for each function, including generalizations with corresponding objectives, additional learning activities, and additional resources; unit outline; pretest; activity sheets with generalization, objectives, background information, discussion questions, equipment list, procedures, and summary; resource list; and posttest. A unit may consist of one or two functions. Unit topics include safe and proper use of equipment and sanitation; eating a variety of foods; digestion and absorption; food science; avoiding too much fat, saturated fat, and cholesterol; eating foods with adequate starch and fiber; avoiding too much sugar; avoiding too much sodium; drinking alcohol in moderation; and maintaining desirable weight. (YLB)

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New Mexico State

Secondary School Science-Based

Nutrition Curriculum

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NEW MEXICO STATE
SECONDARY SCHOOL SCIENCE-BASED
NUTRITION CURRICULUM

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RATIONALE OF THE NUTRITION CURRICULUM

Prudent dietary choices are the cornerstone of a healthy lifestyle. The ability to make wise dietary choices is dependent upon appropriate education and application of that knowledge. The impetuses for this curriculum are to encourage the teaching of nutrition at the secondary level and to increase the incorporation of scientific concepts in the secondary home economics curriculum. Home Economics is based upon the application of scientific principles to problems encountered by the family. This curriculum emphasizes these aspects of the study of nutrition.

Nutrition Curriculum
Unit 1

Safe and Proper Use of Equipment and Sanitation

Nutrition Curriculum Unit One

<Safe and Proper Use of Equipment and Sanitation>

I. Function: Identify correct equipment and methods used in food preparation.

GENERALIZATIONS:

1. Safety in clothing, handling and storing of supplies and equipment is important in order to avoid personal injury.

2. Proper use of laboratory equipment promotes accurate results.

OBJECTIVES:

The student will be able to:

A. Name laboratory equipment, and explain its correct and safe use.

B. Explain principles concerning fire and safety rules.
 a. Identify kitchen ingredients and equipment which may be effective in putting out fires.
 b. Identify safe laboratory procedures using short answers, safety pretest.

C. Be able to demonstrate proper use, care, and storage of equipment.

ADDITIONAL LEARNING ACTIVITIES:

1. Demonstrate how to put out different types of fires: chemical, electrical, etc.

ADDITIONAL RESOURCES:

Arm and Hammer Fire Pail Kit
Arm and Hammer Division,
Church & Dwight Co., Inc. P.O.
Box 7648 Princeton, NJ 08540

SAFETY IN THE KITCHEN

The prevention of kitchen accidents is dependent on following some basic procedures and appropriate and safe usage of kitchen equipment.

I. Prevention of Kitchen Accidents

A. Keep work spaces orderly.
1. Store all utensils and small appliances in their proper place.
2. Keep walls, work areas, and appliances free from grease.

B. Proper use and maintenance of equipment and supplies can prevent explosions.
1. Leaks in gas ranges can cause explosions.
2. Hot grease can explode.
3. Mixing cleaning products improperly, such as chlorine bleach and ammonia (such as in sink cleanser), can cause explosions.

C. Kitchen fires should be handled properly.
1. Cloth and paper fires may be doused with a fire extinguisher or water.
2. Grease fires can be put out by using a chemical fire extinguisher, smothering the fire with a tight-fitting lid, or pouring baking soda or salt directly on the flames.

D. Electrical shock can be prevented.
1. Only properly grounded electrical equipment should be used.
2. Frayed electrical cords and bare wires should not be touched.
3. Electrical cords should not be handled with wet hands or when standing in water.
4. Appliances should be disconnected by holding the plug, not the cord.

E. Burns can be avoided.
1. A large kettle should be used to fry foods so that grease will not boil over.
2. Pot handles should be turned away from front of range.
3. Loose jewelry and loose-fitting clothing should not be worn close to the range.
4. Flammable materials do not belong close to burners.

SAFETY IN THE KITCHEN (continued)

5. When lifting a pot lid, the lid should be tilted toward the cook to prevent steam burns.

F. Cuts can be prevented.
   1. The correct size knife should be used.
   2. Food should be sliced on a cutting board.
   3. The knife should be pointed away from the user.
   4. Work surfaces should be kept uncluttered.
   5. Knives and other sharp objects should be washed separately.
   6. Broken glass should be swept and discarded immediately.

G. Falls and strains are common kitchen accidents.
   1. A sturdy stool is necessary for hard-to-reach objects.
   2. Spills need to be cleaned as soon as they occur.
   3. When lifting heavy objects, leg muscles should be used instead of back muscles.

Proper Use of Kitchen Equipment

Circle the answer that best completes each question.

1. The best way to unplug a mixer is to
   a. Pull on the cord.
   b. Hold the plug securely and pull.
   c. It doesn't matter - either way is O.K.

2. The safest way to slice a tomato is
   a. to slice it in your hand with the knife pointed toward you.
   b. to slice it in your hand with the knife pointed away from you.
   c. to slice it on a cutting board.

3. To put out a grease fire
   a. use dry materials such as salt or baking soda.
   b. put water on it as quickly as possible.
   c. smother it with a blanket.

4. When removing a pan from the stove,
   a. use a dry, folded dish towel.
   b. use a clean, padded potholder.
   c. use the corner of an apron.

5. Which of the following is NOT necessary in preventing burns?
   a. Never wear loose jewelry or clothing to cook in.
   b. Keep pan handles turned away from the front of the range.
   c. Keep paper and cloth away from burners.
   d. Always wear safety glasses when frying foods.

Complete the following sentences.

1. One thing everyone can do to prevent accidents in the kitchen is to

____

2. When I see laboratory hazards in the future, I will

____

Nutrition Curriculum
Unit #1
Function #I
Activity #1

NAME OF ACTIVITY: PROPER USE OF EQUIPMENT FOR FOOD PREPARATION

GENERALIZATION: Safety in handling equipment is important in order to avoid personal injury.

OBJECTIVES: Be able to demonstrate proper use, care, and storage of equipment.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

What equipment is used in each recipe?
What are safety precautions associated with the equipment used?
How can hazards be avoided during the preparation of these recipes?

EQUIPMENT:

Food processor
Mixing bowls
Baking dishes
Measuring utensils
Recipes

PROCEDURES:

1. Students will read each of the following recipes and discuss the precautions needed during preparation to prevent kitchen accidents.
2. Students will list precautions and procedures necessary to complete the recipes, noting applicable safety rules for each recipe.
3. Students will prepare recipes, demonstrating proper use of equipment.

SUMMARY: Use of appropriate equipment in the proper manner is safe usage. In addition, appropriate usage increases the appliance's lifetime, thus decreasing costs.

TUNA TOPPER

2 medium carrots, trimmed and pared
1 can (8 ounces) tuna in water
1 package (3 ounces) cream cheese,softened
low-salt whole wheat wafers, other crackers, and/or celery sticks

Using the food processor with the blade in place, shred the carrots. Remove the shredding blade; place the chopping blade in the processor; add the tuna with liquid and the cream cheese to the carrots and process about 1 minute, until mixture is smooth. Stop the processor once or twice to scrape the mixture from the sides of the bowl. (Carrots may be shredded by hand; place them in a medium bowl. In a small bowl, mash tuna and liquid with a fork until smooth; stir the tuna and cream cheese into the carrots until blended.)
To serve, spread about 1 tablespoon of the mixture on each wafer, cracker or celery stick.

Makes 1 2/3 cups; 2/3 cup = 230 calories.

BETTER BAKED APPLES

4 red baking apples
cinnamon
1 cup water
8 teaspoons caramel topping

Cut a 1/2 inch slice from the tops of the apples. Core the apples without cutting through to the bottoms. Sprinkle the apples with cinnamon and replace the tops. Place in an 8- or 9-inch round microwave-proof pie plate. Pour the water into the plate. Microwave on high (100%) setting 8-10 minutes or until tender. Remove the apple tops and spoon 2 teaspoons of caramel topping into each apple. Replace the tops and let the apples stand 5 minutes.

Makes 4 servings, 110 calories each.

Nutrition Curriculum
Unit #1
Function #I
Activity #2

NAME OF ACTIVITY: EQUIPMENT IDENTIFICATION

GENERALIZATION: Proper use of laboratory equipment promotes accurate results.

OBJECTIVES: Name laboratory equipment and explain its correct and safe use.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS: A wide variety of cookery tools are available. Some are necessities, while others are nice to have. In discussing various tools in class, the following questions may be used:

1. What purposes will the tool serve?
2. Can it be handled easily?
3. Will it be easy to clean and store?
4. How much does it cost?
5. How often will it be used?
6. Is this tool necessary or nice to have?

EQUIPMENT: Actual tools or pictures of equipment for students to identify.

PROCEDURES:

1. Each tool will be shown to class, and its proper use will be explained.
2. Students will be given a copy of the equipment list for inclusion in their classroom notebooks.
3. Following the lecture, students will be tested on proper use of equipment. A copy of the class equipment list may be used as a post test or teacher may display actual tools and ask for their proper uses.

SUMMARY: A working knowledge of kitchen equipment is necessary in the food preparation class. Before students are allowed to take part in food preparation, adequate knowledge of the tools that will be used is essential.

RESOURCES

Blinn, L. (1989). Foods and nutrition: A practical approach (2nd ed.). Cincinnati: Southwestern Publishing.

Medved, E. (1984). The world of food (4th ed.). Needham: Prentice Hall.

Nutrition Curriculum Unit One

<Safe and Proper Use of Equipment and Sanitation>

II. Function: Identify causes of food borne illnesses and treatments.

GENERALIZATIONS:

1. Sanitation involves keeping the work surfaces free of dirt and other contaminants.

2. Surface areas are susceptible to contaminants or reactions to foods.

3. Spoilage is the negative effect of microbial changes in food.

4. Food spoilage is caused by bacterial growth, enzymes, yeast, molds, oxidation, and rancidity.

5. Food borne illnesses can be caused by improper food handling.

OBJECTIVES:

The student will be able to:

A. Identify characteristics of microbial life.

B. Classify several types of food spoilage.

C. Identify types of food spoilage.

D. List foods that are most susceptible to bacterial growth.

E. Identify methods available to prevent food spoilage and other kinds of microbial changes.

F. Hypothesize as to the results of improper food handling.

G. Utilize experimental methods to test hypotheses concerning changes in food caused by improper food handling and storage.

ADDITIONAL LEARNING ACTIVITIES:

1. Create bacteria cultures from work surfaces: porous vs. non-porous; i.e. stainless steel, enamel, iron or wood.

2. "Will it Spoil?" Conduct an experiment to discover what foods spoil. Observe for five days and record your findings.

3. Discuss temperatures which are safe for foods. Use "Safe Temperature" handout for information sheet.

4. "Subsurface Mold Growth on Foods." Observe serial and submerged molds on bread, apple, cheese.

5. Do the experiments in the Food Handling Detective Story to discover proper food handling methods.

6. Read The Safe Food Book. Discuss types of food poisoning and foods that are most often the culprits.

ADDITIONAL RESOURCES:

"Hello Jello" Experiment, Montana State Curriculum

Will it Spoil? FOOD....Your CHOICE, Level 3, National Dairy Council, Rosemount IL., 1980. Unit Two, Activity 7A.

"Subsurface mold growth on foods," Experiments in Food Science, The Institute of Food Technology, 221 N. LaSalle, Chicago, IL 60601, pp.7-10.

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Food Handling Detective Story. Food....YOUR CHOICE, Level 3. National Dairy Council, Rosemount, IL,1980, Unit Two, Activity 7B

USDA. (1984). The Safe Food Book. Pueblo: Food Safety and Inspection Service. Homes and Gardens Bulletin 24.

Nutrition Curriculum
Unit #1
Function #II
UNIT OUTLINE

"ARE YOU HAVING UNINVITED GUESTS FOR DINNER?"

Introduction and Rationale:
Every year, millions of people experience an upset stomach, diarrhea, or abdominal cramps and assume it's a "bug" that's going around. However, these may be the symptoms of food poisoning caused by harmful bacteria in foods people have eaten. These illnesses can be controlled. All it takes is information and the application of basic personal hygiene procedures until they become habits. The purpose of learning about sanitation in the handling of foods is to reduce the chance of getting food poisoning in the home or food services industry.

I. Foodborne illness from contaminated or spoiled foods.

  A. The four types of bacterial contamination which most often cause foodborne illnesses
    1. Salmonella - one of the most common causes of food poisoning. More than two million cases of illness from Salmonella bacteria are believed to occur in the U.S. each year.
      a. Symptoms: nausea, vomiting, abdominal cramps, diarrhea, and fever
      b. Source: foods such as raw meat, poultry, eggs, and dairy products; individuals who do not wash their hands properly after restroom visits or after handling raw poultry; or mice, rats, or cockroaches that contaminate food by dragging their filth over food and utensils.
      c. Treatment: There is no way to look at, smell, or taste food and determine if Salmonella is present. Salmonella germs are destroyed by heat; use a meat thermometer, cook food thoroughly, and reheat leftovers thoroughly to prevent infection from these bacteria.
    2. Staphylococcus - is a common bacteria associated with colds and infected skin abrasions.
      a. Symptoms: stomach cramps, diarrhea, and vomiting symptoms that appear within two to four hours after eating and may last for one to two days.
      b. Source: a bacteria found on the skin and in the nose and throats of people and on raw meat. Often associated with individuals having colds, infected cuts, infected burns, or skin disruptions. Air is contaminated by the sneezing or coughing of individuals with colds. Any food that comes in contact with people during its processing or preparation can become contaminated. Moist foods such as custards, cream-filled

"ARE YOU HAVING UNINVITED GUESTS FOR DINNER?"(continued)

pastries, and egg, ham, chicken, are particularly susceptible to contamination.

   c. Tuna, macaroni or potato salads whose ingredients come into contact with the skin of food handlers are most often involved in food poisoning by Staphylococcus bacteria.
   d. Treatment: "Staph" germs, when they become too numerous, form a poison which CANNOT be boiled or baked away. Prevention is the cure for these germs. Wash hands and utensils carefully with hot, soapy water; clean and disinfect cutting boards thoroughly; refrigerate prepared food quickly after preparation; do not let these foods stand at room temperature for long periods of time; and keep the food covered.

3. Clostridium perfringens - is more widespread than any other disease-causing bacteria. It can be found in soil, dust, on foods, and in the intestinal tracts of people and warm-blooded animals.
   a. Symptoms: diarrhea and stomach pain after 4 to 22 hours - usually in about 12 hours.
   b. Source: anywhere that food is prepared and left to stand at room temperature for long periods of time. This bacteria withstands freezing and low cooking temperatures.
   c. Treatment: always thoroughly cook meats, keep them hot (above 140 degrees F. or 60 degrees C.), and serve them hot. Refrigerate any meat cooked for later serving, and thoroughly reheat leftover meats, casseroles, and gravies before serving. Chill foods quickly (90 minutes or less) in shallow, smaller size containers.
4. Botulism - is the most serious type of food poisoning. A tiny amount of the poison produced by these germs can be fatal.
   a. Symptoms: serious illness and even death. Signs of botulism poisoning appear 12 to 36 hours after eating. The symptoms are double vision, inability to swallow, difficulty in speaking, and progressive paralysis of the throat and lungs. If these symptoms occur, SEE A DOCTOR IMMEDIATELY!
   b. Source: most commonly associated with home-canned meat and low-acid canned vegetables such as green beans, beets, and corn. Soil and dust are undoubtedly the source of contamination of vegetables by this bacteria. The intestinal tract of animals is the source of contamination

"ARE YOU HAVING UNINVITED GUESTS FOR DINNER?"(continued)

meat and meat products.

c. Treatment: inspect ALL food containers before opening and serving. Look for these signs of botulism poisoning: broken, bent or bulging cans, a strange COLOR or an unusual ODOR of the food. Avoid food in containers with broken or leaky seals. If in doubt: DON'T TASTE IT, THROW IT OUT. Botulism poisoning is rare today because of the strict health controls used by most commercial food manufacturers. Home canning must use high heat and pressure cooker methods to insure the safety of low acid vegetables and meat products.

B. Three types of food spoilage are caused by:

1. Enzymes - speed up chemical changes in food, especially fruits and vegetables. They cause loss of flavor and color. Fruits soften. Vegetables get tough and fibrous.
    a. Signs: rarely harmful because chemical changes in the appearance, smell, and texture produce an unappetizing product that is rarely eaten.
    b. Source: occur naturally in foods
    c. Treatment: cold temperatures slow down the activity of enzymes; thus, ripe fruits and vegetables should be refrigerated. Throw out produce that is beginning to decay because it will cause other produce to begin to decay. Temperatures over 140 degrees F. (60 degrees C.) kill most enzymes; thus, cooking destroys the effects of enzymes.
2. Molds - are microscopic plants called fungi that grow as furry-looking patches on food. They may or may not be harmful to humans. They are different colors, depending on the mold.
    a. Signs: unpleasant musty odor and flavor in foods. Some individuals develop allergies to molds which affect the sinuses, eyes, ears, and respiratory tract.
    b. Source: occur naturally in the environment and can grow on almost any food at almost any storage temperature, under almost any conditions - moist, dry, acid or nonacid, salty or sweet.
    c. Treatment: most molds can be killed by heating them to 140 degrees F. (60 degrees C.) for 10 minutes. Freezing prevents the growth of molds, but does not kill those already present in food.

"ARE YOU HAVING UNINVITED GUESTS FOR DINNER?"(continued)

3. Yeasts - are small microorganisms that require sugar and moisture for survival. When they consume those ingredients in food products, the food spoils in the process called fermentation.
    a. Signs: the appearance of tiny air bubbles and an alcoholic smell or taste; a slime on pickle brine or fruit juices, or a pink discoloration in cottage cheese. No evidence suggests that yeasts occurring naturally in foods are harmful to human beings.
    b. Source: occur naturally in foods.
    c. Treatment: can be killed by heating to 136 degrees F. (58 degrees C.) for about 15 minutes. The unpleasant smell usually causes fermented foods to be thrown away.

II. Sanitation in food handling procedures

A. Personal hygiene practices for the handling and preparation of food
1. Bathe or shower daily, use an effective deodorant.
2. Keep fingernails clean, trimmed, and free of polish.
3. Keep hair clean, neatly cut and groomed.
4. Wear clean clothing and a clean apron.
5. Avoid bringing any cut or sore into direct contact with food or food preparation.
6. Wash hands with warm, soapy water before handling food, and wash hands often while preparing food.

B. Sanitary practices for the handling and preparation of food
1. Handle food using tongs, forks, ladles, and spoons.
2. Do not touch the food-contact or human-contact areas of glasses, cups, silverware, or dishes.
3. Avoid licking the fingers during food preparation or putting the tasting spoon back into food after using it for tasting.
4. Avoid coughing or sneezing directly on food. Cover all coughs and sneezes with a disposable tissue, then dispose of tissue immediately and properly.
5. Wash hands often, especially after handling raw foods, when changing food preparation jobs, after handling refuse, and after cleaning food preparation surfaces.
6. Thoroughly clean and sanitize cutting boards and knives used to cut raw meat and poultry immediately after use.

"ARE YOU HAVING UNINVITED GUESTS FOR DINNER?"(continued)

7. Clean raw foods thoroughly.
8. Defrost frozen foods according to accepted procedures. The four acceptable methods for thawing frozen foods are (1) under refrigeration, (2) under cold running water, (3) as part of the conventional cooking process, or (4) in a microwave oven.
9. Stir foods during cooking to assure that every particle of the mixture is completely cooked.
10. Store cooked foods in shallow containers in the refrigerator, DO NOT allow them to cool at room temperature before storing.
11. Cover foods during storage.

III. Time-and-temperature principle for protecting food during preparation

A. KEEP COLD FOODS COLD - All potentially hazardous food should be kept at an internal temperature of 40 degrees F. (4 degrees C.) or below during storage and service.

B. KEEP HOT FOODS HOT - All potentially hazardous food should be cooked to an internal temperature of 180 degrees F. (82 degrees C.) and held at temperatures above 140 degrees F. (60 degrees C.) during service.

C. ALLOW FOODS TO BE IN THE DANGER ZONE AS SHORT A TIME AS POSSIBLE - Microorganisms grow most rapidly at room temperatures, between 60 degrees F. (15 degrees C.) and 120 degrees F. (49 degrees C.). This range of temperatures is called the "danger zone." Keep foods in the "danger zone" as short a time as possible during food preparation.

D. STORE LEFTOVERS QUICKLY AND CORRECTLY
   1. Food most frequently associated with foodborne illnesses such as milk dishes, meat and egg salads, creamed casseroles, and coffee cream from the table should be discarded.
   2. Other highly perishable leftover foods can be planned for reuse within 24 hours if proper methods of holding and reheating are used.
   3. All cooked, perishable leftovers should be chilled to an internal temperature of 40 degrees F. (4 degrees C.) or less within 2 to 4 hours.
   4. Freezing temperatures preserve leftover foods for longer periods of time than refrigeration.

"ARE YOU HAVING UNINVITED GUESTS FOR DINNER?"(continued)

However, freezing does NOT KILL microorganisms. It only slows down their growth.

5. KEEP IT COVERED - Keeping food covered helps keep it clean and free from cross contamination.

Nutrition Curriculum
Unit #1
Function #II
Activity #1

NAME OF ACTIVITY: CREATE BACTERIA CULTURES FROM COMMON UNSANITARY CONDITIONS

GENERALIZATIONS: Sanitation involves keeping the work surfaces free of dirt and other contaminants.
Surface areas are susceptible to contaminants or reactions with food.

OBJECTIVES: Identify characteristics of microbial life.
Hypothesize as to the results of improper food handling.

BACKGROUND INFORMATION: Refer to Unit Outline sections I., A. and II., A. View filmstrip describing the microorganisms that cause food poisoning and give guidelines for personal hygiene and kitchen sanitation (suggested filmstrip: "Safety and Sanitation in Handling Food" see reference list at end of unit).

DISCUSSION QUESTIONS:
What is a foodborne illness?
What are the four types of bacteria that commonly cause food poisoning?
Under what conditions do bacteria thrive best?
Name three specific steps that can be taken to control the growth of bacteria in foods.
Why should we be concerned with the food-borne illnesses caused by bacterial contamination?
What sanitation practices can be used during food preparation and serving to avoid contamination by bacteria?

EQUIPMENT: Agar Plates from supply source or dry agar and petri dishes (dry agar will have to be prepared prior to the lab experiment following directions on the product), grease pencils, cellophane tape, microscopes, and experiment handout

PROCEDURES:

1. Divide class into small groups. Each group will use 2 agar plates for the experiment.

CREATE BACTERIA CULTURES FROM COMMON UNSANITARY CONDITIONS (continued)

a. On the underside of the plate, draw two lines which divide the plate into four sections using the grease pencil. Three of the sections will contain a contaminant, the fourth will be the control.
b. Students can choose 3 contaminants: a hair; using a small piece of cellophane tape touch runny nose, or take a sample from top of table, a water fountain, the floor, clothing, any piece of equipment; or, without washing hands, touch finger to agar.
c. The 4th section of the agar is the control section. Keep the control section of the agar plate covered as much as possible and protect the entire plate as much as possible while adding the contaminants.
d. Replace cover as soon as contaminants are in place.

2. Label each section of the plate on the under side as it is prepared to aid in future identification. Each group will place one experiment in the refrigerator to incubate and the other at room temperature to incubate.
3. View each plate under the microscope at the time it is prepared. On the handout, record what you see.
4. Groups will observe their experiments under the microscope 24 hours later, 48 hours later and several days later. Groups will record, on the handout, the results of the growth of bacteria by counting the cultures which have grown.
5. Compare the sections from the refrigerator culture and room temperature culture. Discuss what happened at the different temperatures. Why did they grow differently? Compare the different types of cultures obtained.

CREATE BACTERIA CULTURES FROM COMMON UNSANITARY CONDITIONS
(continued)

6. Follow-up Activities:
   Observe the growth of bacteria under common household conditions, and predict what happens to food that is handled under unsanitary conditions.
   Keep a record of the observations, entering data accurately. Communicate the results.

SUMMARY: Science provides the basis for developing common-sense sanitation practices in food preparation and handling.

Nutrition Curriculum
Unit #1
Function #II
Activity #1

CREATE BACTERIA CULTURES FROM COMMON UNSANITARY CONDITIONS

EXPERIMENT: To study microorganisms that cause foodborne illnesses.

MATERIALS: 2 Agar plates, grease pencil, cellophane tape

PROCEDURE: 1. Without removing cover, use the grease pencil to draw 2 lines on the underside of the plate which divide the plate into 4 equal sections.

2. Choose 3 contaminants from the environment, and inoculate one section of the agar plate at a time. Keep the 4th section as a control.

3. Label each section with the name of the contaminant on the underside.

4. Store one plate in the refrigerator, the other at room temperature.

5. View each plate under the microscope at the designated times.

6. Count the cultures that have developed and record your findings on the chart.

CONTAMINANT	NUMBER OF CULTURES:				CONCLUSIONS
	Day 1	Day 2	Day 3	Day 4	

Draw a simple illustration of the bacteria you viewed in each culture under the microscope.

SUMMARY:
1. What were the differences in the appearance of the cultures?
2. Which cultures grew the most bacteria?
3. What conclusions can you make concerning good sanitation practices?

Nutrition Curriculum
Unit #1
Function #II
Activity #2

NAME OF ACTIVITY: TEST COMMON FOOD ITEMS FOR THE SPOILERS (YEAST, MOLDS & ENZYMES)

GENERALIZATIONS:

Spoilage is the negative effect of microbial changes in food.
Food spoilage is caused by bacterial growth, enzymes, yeast, molds, oxidation and rancidity.

OBJECTIVES:

Classify several types of microbial life.
Identify types of food spoilage.
Hypothesize the results of improper food handling.
Utilize experimental methods to test hypothesis concerning changes in food caused by improper food handling and storage.

BACKGROUND INFORMATION:

Refer to Unit Outline, sections I., B. and II., B. View filmstrip describing guidelines for personal hygiene and kitchen sanitation and why they are important ideas for safe food preparation, storage, and serving.

DISCUSSION QUESTIONS:

What are three types of microorganisms that commonly cause food to spoil?
How do enzymes cause food to spoil?
Describe the appearance of mold.
How can yeast spoilage be recognized?
Under what conditions do these spoilers grow best?
What sanitation practices can be used during food preparation, serving, and storage to avoid the "spoilers"?

EQUIPMENT:

Ingredients:
1 cup water, 15 pinto beans
1/2 cup grape juice, pinch of dry yeast
1/2 of a slice of white bread.

Equipment:
depression slides (2/group), cover slides (2/group), petroleum jelly, inoculation loops, Pyrex custard cups or measuring cups (2/group), plastic bags, plastic wrap or lids to cover custard or measuring cups, microscopes and magnifying glasses, grease pencils.

TEST COMMON FOOD ITEMS FOR THE SPOILERS (YEAST, MOLDS & ENZYMES) (continued)

PROCEDURES:

1. Each group will prepare three ingredients to observe and discuss.
    a. Place one cup of water and about 15 beans in a heat-resistant measuring cup or custard cup. Bring to a boil (use the microwave), and cook beans for about 5-6 minutes. Cool, and cover with plastic wrap fairly tightly. Let beans stand at room temperature for 24 hours.
    b. Place 1/2 cup grape juice in a clean glass or beaker. Add a pinch of dry yeast. Stir yeast to dissolve. Cover fairly tightly, and let stand at room temperature for 24 hours.
    c. Use two plastic bags. Place 1/4 slice of white bread in each bag and close bag securely. Store one at room temperature and the other in the refrigerator. Mark each experiment with group # for observation.
2. After 24 hours, observe bread, and count number of cultures formed in each bag. Use magnifying glass to view experiment. Record culture count on experiment handout.
3. Prepare a depression slide for both the water from the beans and the grape juice. View under the microscope and see if there are moving cultures. Record your findings (use drawings).
    a. Lightly coat around the edge of the depression slide with a tiny bit of petroleum jelly.
    b. Use the inoculation loop (or a clean dropper) and place a tiny drop of liquid from either the beans or the juice on the slide cover.
    c. Place the slide cover over the depression in the slide and press to seal cover with petroleum jelly.
    d. Quickly invert the slide. Place the slide under the microscope and view the culture (Note: the drop of

TEST COMMON FOOD ITEMS FOR THE SPOILERS (YEAST, MOLDS & ENZYMES) (continued)

liquid needs to be hanging in order to see the movement). Repeat for the other liquid.

4. Repeat the experiment after 48 hours and record your findings. Identify the type of culture in the two liquids. Are they the same? Compare the growth of culture on the bread at room temperature and refrigerated. Discuss why there is or is not a difference. Hypothesize which medium contains enzyme reactions, yeast reactions, and mold reactions. Do some of the cultures have more than one reaction?
5. Observe the growth of the "spoilers" in the experiment and predict what happens to food that is handled with proper and improper storage techniques.
   Keep a record of the observations, entering data accurately, and communicate the results.

SUMMARY: Science provides the basis for developing common sense rules for the preservation and storage of food stuffs to insure food that is safe for consumption.

Nutrition Curriculum
Unit #1
Function #II
Activity #2

TEST COMMON FOOD ITEMS FOR THE SPOILERS (YEAST, MOLDS & ENZYMES)

EXPERIMENT: To study how yeast, molds, and enzymes cause spoilage in foods.

MATERIALS: 2 depression slides with covers, petroleum jelly, inoculation loops, Pyrex bowls or beakers, plastic bag, plastic wrap, microscope, magnifying glass, grease pencil

PROCEDURE:

DAY 1:

1. Place one cup of water and about 15 pinto beans in custard cup. Bring to a boil in the microwave (about 2 minutes), continue to boil for 5-6 minutes. Cool and cover with plastic wrap and let it sit at room temperature for 24 hours.

2. Place 1/2 cup grape juice in a custard cup. Add a pinch of dry yeast and stir until it is dissolved. Cover with plastic wrap and store at room temperature for 24 hours.

3. Place 2 pieces of white bread in a plastic bag, and close bag. Store one in the refrigerator and the other at room temperature.

DAY 2:

1. Prepare a depression slide for the bean juice and grape juice following directions from your instructor.

2. View slide under the microscope. Count the number of moving cultures or plants in the slide and record on the following chart. Repeat these procedures (for Day 2) 24 hours later and record your findings.

CULTURE	DAY 1	DAY 2	CONCLUSIONS
1. Bean juice			
2. Grape juice			
3. White Bread (room temp)			
4. White Bread (refrigerated)			

TEST COMMON FOOD ITEMS FOR THE SPOILERS (YEAST, MOLDS & ENZYMES)

EXPERIMENT: To study how yeast, molds, and enzymes cause spoilage in foods (continued).

SUMMARY:

1. Under what conditions do these spoilers grow best?
2. How do enzymes cause food to spoil?
3. Describe the appearance of mold.
4. How can yeast spoilage be recognized?
5. What sanitation practices can be used during food preparation, serving, and storage to avoid the "spoilers"?

Nutrition Curriculum
Unit #1
Function #II
Activity #3

NAME OF ACTIVITY: FOODBORNE ILLNESSES CROSSWORD PUZZLE

GENERALIZATIONS: Food spoilage is caused by bacterial growth, enzymes, yeast, molds, oxidation, and rancidity.

OBJECTIVES: Identify types of food spoilage.
List foods that are most susceptible to bacterial growth.

BACKGROUND INFORMATION: Refer to Unit Outline: "ARE YOU HAVING UNINVITED GUESTS FOR DINNER?".
Filmstrips: "Sanitation Sense" and "Safety and Sanitation in Handling Food" (See reference list at end of unit.)

DISCUSSION QUESTIONS:

What are the four types of microbiological contaminants that cause food poisoning and food spoilage?
At what temperature does the most rapid bacterial growth occur?
What kinds of food are most frequently associated with foodborne illnesses?
Why is personal hygiene the "first line of defense" against food poisoning?
What are the time-and-temperature principles for safe food handling?

EQUIPMENT: Crossword puzzle "SANITATION"
Answer sheet for puzzle and an optional word list for low reading level students.

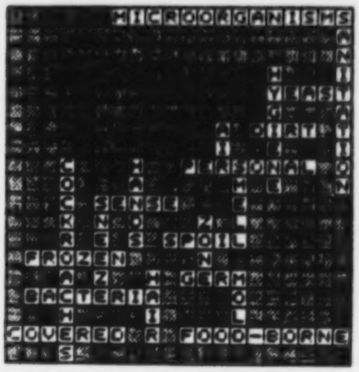
PROCEDURES:

1. Fill in the crossword puzzle using the missing words from the clues related to sanitation practices and foodborne illnesses. (Lower reading level students can be provided with a word list to assist in completing the puzzle.)
2. Discuss the questions listed above to interpret the important concepts relating to the study of sanitation in food handling.

FOODBORNE ILLNESSES CROSSWORD PUZZLE (continued)

SUMMARY: Communicate accurate information concerning sanitation practices by entering correct vocabulary definitions.
Infer logical conclusions and interpretations from the information which can be used to formulate good sanitary practices in the handling of food.

"SANITATION" Crossword Puzzle Answer Form



"SANITATION" Crossword Puzzle Optional Word List

AIR
BACTERIA
COVERED
COCKROACHES
DIRT
FOODBORNE
FROZEN
GERM
HANDS
HAIR
HYGIENE
MICROORGANISMS
MOLD
PERSONAL
SANITATION
SENSE
SMELL
SNEEZE
SPOIL
YEAST
ZONE

Nutrition Curriculum
Unit #1
Function #II
Activity #3

SANITATION CROSSWORD PUZZLE CLUES

All the words in this crossword puzzle have something to do with sanitation. Read the clues on this page and fill in the blanks on the puzzle.

ACROSS CLUES

1. THE FOUR TYPES OF ________ WHICH AFFECT FOODS ARE BACTERIA, ENZYMES, YEASTS AND MOLDS.
4. ________ CAN GROW IN ACIDIC FOODS SUCH AS TOMATO JUICE OR FRUIT JUICE.
6. FINGERNAILS SHOULD BE FREE OF ________.
9. ________ HYGIENE IS A HEALTHY WAY OF LIFE.
11. EVERYONE WORKING IN FOOD SERVICE SHOULD UNDERSTAND AND PRACTICE SANITATION _____.
13. IF FOOD IS LEFT AT ROOM TEMPERATURES TOO LONG, IT WILL ________.
14. BACTERIA STOP GROWING IN FOOD THAT ARE _____AND KEPT AT A TEMPERATURE BELOW 0 DEGREES F.
16. ANOTHER NAME FOR A BACTERIUM IS A _______.
18. ________ MULTIPLY RAPIDLY AT TEMPERATURES BETWEEN 60 AND 120 DEGREES F.
19. FOOD THAT IS WAITING TO BE SERVED SHOULD BE ________.
20. A ________ ILLNESS IS A DISEASE CAUSED BY EATING FOOD WHICH CONTAINS HARMFUL MICROORGANISMS.

DOWN CLUES

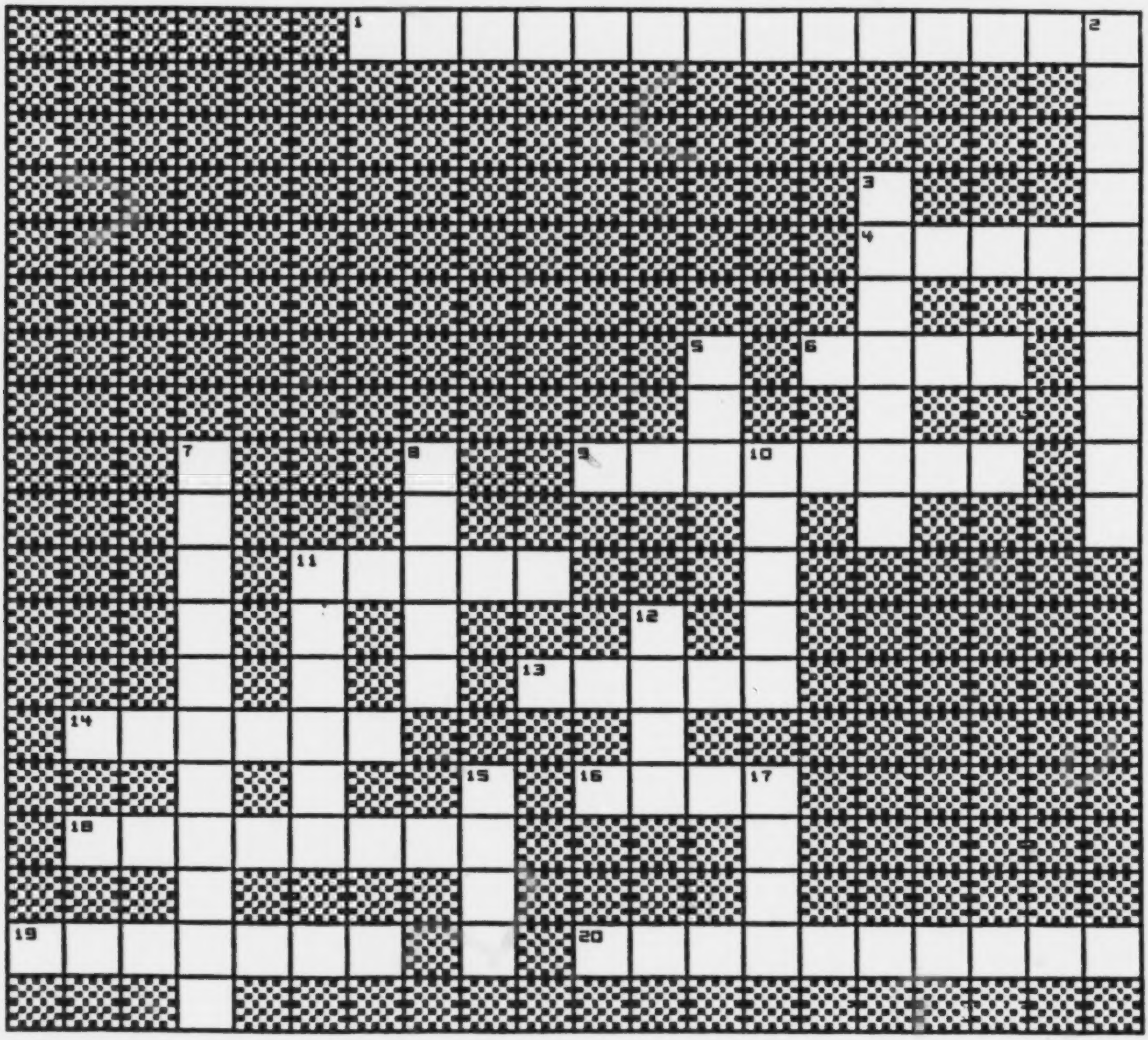
2. ________ INVOLVES THE CREATION AND MAINTENANCE OF CONDITIONS FAVORABLE TO GOOD HEALTH.
3. PERSONAL ________ INVOLVES KEEPING THE FOOD PREPARATION PERSON FREE OF CONTAMINANTS.
5. MANY BACTERIA CAN BE FOUND IN THE ________.
7. ________ ARE ONE KIND OF INSECT THAT CAN SPREAD BACTERIA.
8. AFTER USING THE TOILET OR A HANDKERCHIEF, YOU SHOULD ALWAYS WASH YOUR ________.
10. YOU CAN TELL BY THE LOOK AND THE ________ IF SOME FOODS ARE SPOILED.
11. WHEN YOU ________, GERMS CAN SPREAD THROUGH THE AIR.
12. THE DANGER ________ FOR FOOD IS FROM 60 DEGREES F. TO 120 DEGREES F.
15. ________ SHOULD BE CLEAN, COMBED, AND KEPT OUT OF FOOD.
17. ________ IS SOMETIMES FOUND ON BREAD THAT HAS BEEN KEPT IN A WARM, DAMP PLACE.

Adapted from:
The activities guides from: Food Service: Skills and Equipment and Food Production, Management, and Services: Student Activities Book (see reference list)
Developed using:
Crossword Magic (1985), L&S Computerware: Mindscape, Inc., Northbrook, Illinois.

Nutrition Curriculum
Unit #1
Function #II
Activity #3

NAME:______________________

SANITATION CROSSWORD PUZZLE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NAME:____________________

"ARE YOU HAVING UNINVITED GUESTS FOR DINNER?"

ACTIVITY: Bacteria unscramble

Food poisoning bacteria are everywhere, waiting to invade your kitchen.
Put the "uninvited guests" on your unwanted list!

PROCEDURE:
These are the bacteria that are usually responsible for food-borne illnesses. Unscramble their names on the broken lines. List examples of foods that are usually implicated when this illness occurs. Write a suggestion for preventing this illness.

1. alslmanoel

   - - - - - - - - - - -

   Foods Implicated:

   Prevention

2. sclpysatocochu

   - - - - - - - - - - - - - - -

   Foods Implicated:

   Prevention:

"ARE YOU HAVING UNINVITED GUESTS FOR DINNER?" (continued)

3. cmluoisdtir spneergfnri

_ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _

Food Implicated

Prevention

4. osbmtiul

_ _ _ _ _ _ _ _ _

Foods Implicated:

Prevention:

Nutrition Curriculum
Unit #1
Function #II
Activity #4

NAME OF ACTIVITY: TIME AND TEMPERATURE PRINCIPLE

GENERALIZATIONS: Spoilage is the negative effect of microbial changes in food. [Simply stated the time-and-temperature principle means KEEP HOT FOODS HOT, KEEP COLD FOODS COLD, KEEP TIME IN THE DANGER ZONE SHORT!]

OBJECTIVES: Identify methods available to prevent food spoilage and other kinds of microbial changes.

BACKGROUND INFORMATION: Refer to Unit Outline, sections II., B., #8-11; and III. The time-and-temperature principle requires that all potentially hazardous food be kept either at an internal temperature of 40 degrees F. (4 degrees C.) or below or above 140 degrees F. (60 degrees C.) during food handling, and be allowed in the danger zone (60-120 degrees F. or 15-49 degrees C.) during preparation and serving no longer than 4 hours total.

DISCUSSION QUESTIONS:

What is the time-and-temperature principle?
Does refrigerating food keep mold from growing? Explain your answer.
What temperature will kill microorganisms?
What temperature will slow down the growth of microorganisms?
Why should foods be wrapped tightly for storing in the refrigerator?
Why can foods be kept longer in freezer storage than in refrigerator storage?

EQUIPMENT: "Temperature Control" handout

PROCEDURES:

1. Using the "Temperature Control" handout, match the happening given on the handout with the temperature at which it happens.
2. Match each picture of a microorganism shown with the temperature it represents.

SUMMARY: Use the information to interpret the need for correct temperature to prevent spoilage of food.

Nutrition Curriculum
Unit #1
Function #II
Activity #4

TIME AND TEMPERATURE PRINCIPLE

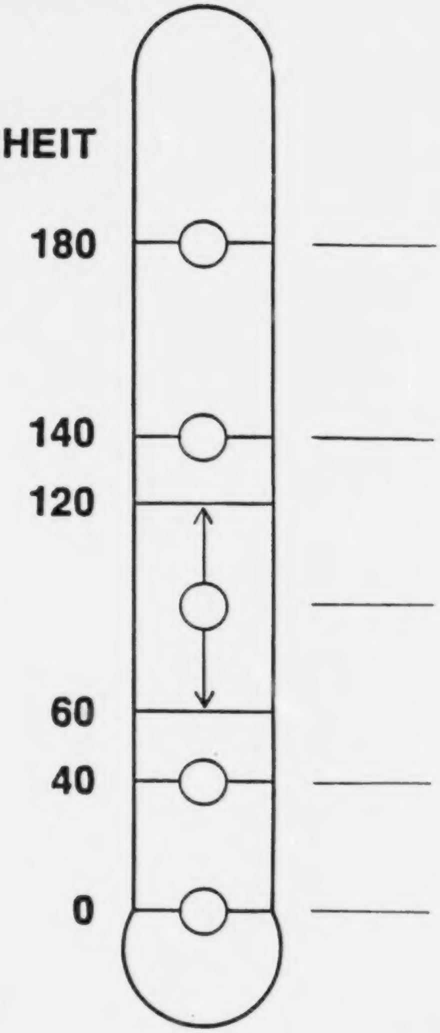
ACTIVITY: Temperature Control

PROCEDURE:
1. Match each happening listed below with the temperature at which it occurs. In each of the circles on the thermometer, write the code letter of the happening that occurs at that temperature.

2. Match each picture of a microorganism shown below with the temperature it represents. On the lines to the right of each temperature, write the code number of the picture that represents what happens to microorganisms at that temperature.

°FAHRENHEIT

A. Bacteria stop growing.
B. Bacteria are destroyed.
C. Bacterial growth slows down.
D. Bacteria grow fastest.



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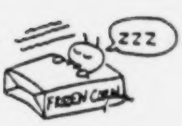

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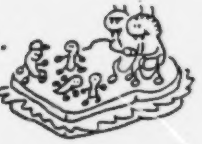

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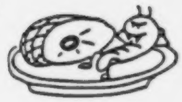

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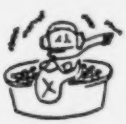

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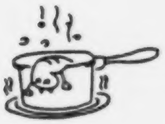

TIME AND TEMPERATURE PRINCIPLE (continued)

SUMMARY:
1. Communicate accurate information concerning the time-and temperature principle by correctly completing the activity.

2. Interpret the time-and-temperature principle to apply to sanitary and safe method to store food, prepare food, and serve food.

- - - - -

Adapted from: Kowtaluk, Discovering Nutrition and Storm, Food Services: Skills and Equipment

Nutrition Curriculum
Unit #1
Function #II
Activity #5

NAME OF ACTIVITY: KITCHEN SANITATION

GENERALIZATIONS: Foodborne illness can be caused by improper food handling.

OBJECTIVES:
Identify types of food spoilage.
List foods that are most susceptible to bacterial growth.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
What foods cause food poisoning?
Why are some foods particularly susceptible to spoilage?
Will foods containing these ingredients also be susceptible to spoilage?

EQUIPMENT: paper and pen or pencil

PROCEDURES:

1. Distribute a list of foods to the students.
2. Have students determine which foods are most likely to cause food poisoning.
3. Have students determine proper storage of the foods listed.

SUMMARY: Some foods are more susceptible to growth of microorganisms and are more likely to cause food poisoning. Proper preparation and storage of these foods is important in providing safe food for our families and customers.

Nutrition Curriculum
Unit #1
Function #II
Activity #5

KITCHEN SANITATION

DIRECTIONS: Circle the foods on this list that are likely to cause food poisoning if improperly stored:

a. grapefruit juice
b. eggs
c. chocolate pudding mix
d. chocolate pudding
e. roast beef
f. margarine
g. macaroni
h. corn flakes
i. oatmeal
j. carrot cake
k. Swiss cheese

For each of these foods indicate below if it should be refrigerated: 1) before it is prepared ; 2) soon after it is prepared; and/or 3) two days after it is prepared.

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

k.

RESOURCES

Kowtaluk, H. (1986). Discovering nutrition (2nd ed.). New York: Bennett & McKnight.

Home Economics Curriculum Center. (1985). Food production, management, and services. Reference book and student activities book. Lubbock, Tx: Texas Tech University.

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Herron, M. (Writer), Franklin Clay Films (Producer), & Harshbarger, F. (Director). (1983). Safety and sanitation in handling food [Film or videotape]. Costa Mesa, CA: Franklin Clay Films.

Nutrition Curriculum
Unit 2

Eat a Variety of Foods

Nutrition Curriculum Unit Two

<Dietary Guidelines for Americans ** Eat a Variety of Foods>

III. Function: Identify nutrients, factors that determine food value and how body functions are affected by nutrients.

GENERALIZATIONS:

1. Food is made up of different nutrients needed for growth and health.

2. No food by itself has all the essential nutrients.

3. Each nutrient has a specific function in maintaining the body's health.

OBJECTIVES:

The student will be able to:

A. Identify the basic four food groups.

B. Classify foods according to the basic four food groups.

C. Define the terms "nutrient" and "nutrition."

D. Define the term "calorie."

E. List major classes of nutrients and the contributions each makes to physical well-being.

F. Analyze foods according to the nutrients they contain using food nutrient charts.

G. Use chemical tests to analyze foods for several different nutrients.

H. Identify personal nutritional needs using the Recommended Dietary Allowances for their age and sex.

I. Identify desirable dietary goals.

J. Estimate his/her individual food consumption.

K. Record his/her individual food consumption.

L. Compare records of actual consumption to estimates of consumption.

ADDITIONAL LEARNING ACTIVITIES:

1. Use chemical tests to analyze foods. See pages 212 - 217 Nutrition Education Today (California)

2. Discuss sources and functions of nutrients. See pages 242 - 249 Nutrition Education Today (California)

3. Complete Food For Thought (works activity) Dairy Council of California, 1986

ADDITIONAL RESOURCES:

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Nutrition Curriculum
Unit #2
Function #III
UNIT OUTLINE

EAT A VARIETY OF FOODS

I. Nutrients - Nutrients are the chemical components of food which are necessary for growth, maintenance and repair of the body. There are approximately 40 essential dietary nutrients, and these are grouped into six specific classes.

A. Carbohydrate
1. An energy-providing nutrient which provides 4 kilocalories per gram.
2. Both simple sugars (sucrose, glucose, fructose) and complex carbohydrates (starch and fiber)
3. Approximately 46% of the energy in the average American's diet (24% of energy from simple sugar) is from carbohydrate. Dietary Guidelines recommends increasing complex carbohydrates to 48% of total energy and reducing simple sugars to 10% of total energy.

B. Protein
1. An energy-providing nutrient which provides 4 kilocalories per gram.
2. Building blocks called amino acids make up proteins.
   a. 22 different amino acids are found in nature.
   b. 9 of the amino acids are dietarily essential.
3. Intake is presently 12% of total energy intake and Dietary Guidelines recommends maintaining that percentage.

C. Lipids
1. An energy-providing nutrient which provides 9 kilocalories per gram
2. Predominant dietary forms commonly called the fats and oils
3. Two essential dietary fatty acids: linoleic and linolenic acids
4. Presently 42% of dietary energy intake is lipid. Dietary Guidelines recommends decreasing this to 30% of energy intake with 10% each coming from monounsaturated, polyunsaturated, and saturated fatty acids.
5. Vegetable oils contain predominantly polyunsaturated fatty acids. Animal fats contain predominantly saturated fatty acids. Olive oil and Canola oil contain predominantly monounsaturated fatty acids.

EAT A VARIETY OF FOODS (continued)

D. Vitamins
   1. By definition all items within this class are organic and dietarily essential in small amounts.
   2. Vitamins are grouped according to their solubility.
      a. Fat-soluble vitamins
         (1) Vitamin A (retinol)
         (2) Vitamin D (calciferol)
         (3) Vitamin E (tocopherol)
         (4) Vitamin K (menaquinone)
      b. Water-soluble vitamins
         (1) Thiamin (vitamin B-1)
         (2) Riboflavin (vitamin B-2)
         (3) Niacin (vitamin B-3)
         (4) Biotin
         (5) Vitamin B-6 (pyridoxine)
         (6) Pantothenic acid
         (7) Vitamin B-12 (cobalamin)
         (8) Folacin (folic acid)
         (9) Vitamin C (ascorbic acid)
   3. This group of nutrients is structurally diverse, unlike the other nutrient classes.
   4. This group of nutrients can be destroyed by heat, oxygen, or light or may be lost by leaching into cooking water.

E. Minerals
   1. Minerals are inorganic nutrients needed in relatively small amounts.
   2. Minerals are classified according to the amount needed in the diet.
      a. Major minerals are required in amounts of 100mg or more per day. Major minerals are:
         (1) Calcium
         (2) Phosphorus
         (3) Potassium
         (4) Sulfur
         (5) Sodium
         (6) Chloride
         (7) Magnesium

EAT A VARIETY OF FOODS (continued)

b. Trace minerals are required in amounts less than 100mg per day. The trace minerals are:
   (1) Iron
   (2) Zinc
   (3) Copper
   (4) Iodine
   (5) Manganese
   (6) Fluoride
   (7) Molybdenum
   (8) Cobalt
   (9) Selenium
   (10) Chromium
   (11) Arsenic
   (12) Tin
   (13) Nickel
   (14) Vanadium
   (15) Silicon

3. Minerals function as structural components (calcium & phosphorus); regulators of water balance and acid-base balance (potassium, sodium, and chloride); and co-factors of specific enzymes (copper, iron, and zinc).

F. Water
   1. Approximately 2 liters are needed by the healthy adult on a daily basis.
   2. Water is obtained through foods and beverages.

II. Guidelines for Nutritious Eating

A. Food Group Systems
A food group system outlines recommended daily intake amounts from food groups in order to provide the majority of the required nutrients. These plans are specific to cultural and geographic area.
   1. Basic Four food groups (recommended servings for teenagers)
      a. Milk - recommended 4 (one cup) servings per day
      b. Protein-rich - recommended 2 (3-4 oz.) servings per day
      c. Fruit and vegetable - recommended 4 (1/2 cup or standard) servings per day
      d. Bread and cereals - recommended 4 (1/2 cup or one slice) servings per day
   2. Exchange system - A dietary plan originally developed for diabetics which incorporates the principles of regulating kilocalorie, carbohydrate,

EAT A VARIETY OF FOODS (continued)

fat and protein intake. Number of servings varies in accordance with the number of kilocalorie in the diet. The servings below are given for a 1800 kilocalorie diet containing 20% of kilocalorie from protein, 30% of kilocalorie from fat and 50% of kilocalorie from carbohydrates.

  a. Milk group (low fat) - 2 (one cup) servings
  b. Vegetable (non-starchy) - 2 (1/2 cup) servings
  c. Fruit - 4 (1/2 cup or one standard) servings
  d. Bread - 10 (1 slice or 1/2 cup) servings
  e. Meat (lean) - 7 (one ounce) servings
  f. Fat - 8 (1 teaspoon) servings

B. Dietary Goals and Guidelines

1. Dietary Guidelines for Americans (USDA, USDHHS, 1985)
   a. Seven recommendations concerning the development of a healthy life style.
   b. An attempt to address the connection between dietary patterns and chronic disease.
   c. The guidelines are:
      (1) Eat a variety of foods.
      (2) Maintain desirable weight.
      (3) Avoid too much fat, saturated fat and cholesterol.
      (4) Eat foods with adequate starch and fiber.
      (5) Avoid too much sugar.
      (6) Avoid too much sodium.
      (7) If you drink alcoholic beverages, do so in moderation.
2. Other dietary guidelines:
   Several federal agencies and public health organizations have developed and published dietary guidelines. Some of these organizations are American Heart Association, National Cancer Institute and the Surgeon General of the PHS.

Nutrition Curriculum
Unit #2
Function #III
Activity #1

NAME OF ACTIVITY: WHAT DO WE EAT?

GENERALIZATION: Food is made up of different nutrients needed for growth and health.

OBJECTIVES:

Identify the Basic Four food groups.
Classify foods according to the Basic Four food groups.
Analyze foods according to the nutrients they may contain using food nutrient charts.
Identify personal nutritional needs using the Recommended Dietary Allowances for age and sex.
Record his/her individual food consumption.
Estimate his/her individual food consumption.
Identify desirable dietary goals.
Compare records of actual consumption to estimates of consumption.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

How many servings did you have from the-
  Milk and cheese group?
  Vegetables and fruits group?
  Meat, poultry, fish, and beans group?
  Breads and cereals group?
  Fats and sweets group?
Was the number of servings above or below the number recommended?
What foods could be added to your diet to better meet the recommendations?
Was there a pattern in the places where you ate certain foods?

EQUIPMENT:

Food Diary
Diet History Evaluation

PROCEDURES:

1. Give each student a copy of "Estimated Food Recall." Have student fill out this form for food eaten for a typical 24 hour period. This will be considered an estimation of actual intake and will be compared with actual intake from the Food

WHAT DO WE EAT? (continued)

Diary.

2. Give each student a copy of the Food Diary.
3. Have each student complete the Diary over the next 24 hours, being as specific as possible.
4. Enter the foods from the Estimated Food Recall and Food Diary into the Diet History Evaluation.
5. Compare the servings actually eaten with the servings recommended for teens and with those estimated from a typical day.

SUMMARY: By analyzing their own intakes, students become more aware of their own eating patterns compared with dietary guidelines.

Nutrition Curriculum
Unit #2
Function #III
Activity #1

ESTIMATED FOOD RECALL

Name: ________________

Try to recall everything you ate:	Food	Amount
Dinner last night		
Before bed snack		
Breakfast and/or morning snack today		
Lunch and/or afternoon snack today		

Nutrition Curriculum
Unit #2
Function #III
Activity #1

FOOD DIARY

Time	Place	Food	Amount	Calorie

Nutrition Curriculum
Unit #2
Function #III
Activity #1

Diet History Evaluation

Using your food diary, divide the foods you ate into the appropriate groups. Then compare what you actually ate with what is recommended.

Servings per Food Group

	Milk	Meat-Beans	Fruits and Vegs			Bread	Sweet
	Cheese	Poultry	Vit C	Vit A	Other	Cereal	Fats
Total # Servings	______	______	____	____	____	______	______
Recommended # of Servings	4	2	1	1	2	4	limited

Nutrition Curriculum
Unit #2
Function #III
Activity #2

NAME OF ACTIVITY: PIECE TOGETHER A PIZZA

GENERALIZATIONS: Food is made up of different nutrients needed for growth and health.
No food by itself has all the nutrients needed for growth and health.

OBJECTIVES: Identify the Basic Four food groups.
Classify foods according to the Basic Four food groups.
List major classes of nutrients and the contributions each makes to health.

BACKGROUND INFORMATION: Review New Mexico Extension Publication E-112.
Review 4-H Project #7261 Fit It All Together, Unit I - Piece Together A Pizza.

DISCUSSION QUESTIONS: What are the Basic Four food groups?
What are nutrients? How do we obtain them?
What is the importance of a balanced diet, especially for youth?

EQUIPMENT:
oil
1 package flaky refrigerator biscuits
1/2 cup tomato sauce
1 teaspoon oregano
baking sheet
measuring spoons
handouts: recipe
1/3 cup chopped, mushrooms, drained
1/2 lb. ground beef
grated cheese - mozzarella or cheddar
1 liquid measuring cup

PROCEDURES:
1. Distribute recipe for Snack Pizzas.
2. Explain that all four food groups will be utilized.
3. Make sure the students read the entire recipe prior to beginning.
4. Follow the steps listed.
5. Follow-up activities:
   When cooking is completed, have students list the four food groups and the number of daily servings required.
   Next, have them list the food used in the pizzas under each of the food groups.
   Have students list other ingredients that could be used as toppings in order to meet the daily four food group requirements.

PIECE TOGETHER A PIZZA (continued)

SUMMARY: Meals can be balanced to include the Basic Four food groups. If daily intake is balanced, most dietary requirements will be met.

Nutrition Curriculum
Unit #2
Function #III
Activity #2

SNACK PIZZA

You Need:

non-stick pan spray
1 package flaky refrigerator biscuits
1/2 cup tomato sauce
grated cheese - mozzarella or cheddar
1/3 cup chopped, fresh or canned mushrooms, drained
1/2 lb. ground beef

Equipment:

baking sheet
1 liquid measuring cup
measuring spoons

Directions:

1. Check to make sure the oven racks are in the middle of the oven.
   Preheat the oven to 400 degrees F.
2. Spray non-stick coating on the baking sheet.
3. Pat each biscuit into a 4-inch circle. Put each circle on the baking sheet.
4. Brown the ground beef.
5. Mix the tomato sauce and the oregano in a measuring cup. Spoon some on each biscuit.
6. Spoon the mushrooms over the tomato sauce.
7. Spoon ground beef on top of the mushrooms.
8. Sprinkle with the cheese.
9. Bake about 8 minutes, or until the crust is light brown. USE A POT HOLDER TO TAKE THE BAKING SHEET OUT OF THE OVEN.

Nutrition Curriculum
Unit #2
Function #III
Activity #3

NAME OF ACTIVITY: MENU PLANNING

GENERALIZATIONS: Food is made up of different nutrients needed for growth and health.
No food by itself has all the nutrients needed for growth and health.

OBJECTIVES: List major classes of nutrients and the contributions each makes to health.
Analyze foods according to the nutrients they contain using food nutrient charts.
Identify personal nutritional needs using the Recommended Dietary Allowances for age and sex.
Identify desirable dietary goals.

BACKGROUND INFORMATION: This activity incorporates what the students learned in the previous activities; therefore, they should be able to complete this activity without any major preparation.

DISCUSSION QUESTIONS: What nutrients are needed each day? Refer to the RDA handout.
Why are a variety of foods are necessary for proper body maintenance?
Why do calorie intake recommendations differ for different people?

EQUIPMENT: 24 hour food diary

PROCEDURES:

1. Have students revise their 24 hour food diary to be nutritionally complete.
2. Discuss problems associated with changing diet habits.

MENU PLANNING (continued)

3. Follow-up activities:
When finished, have students evaluate and discuss their menus.

Which of the four food groups did they have the most difficulty in completing or which were they continually abundant in?
Could they incorporate any substitutions in their menus in case of emergencies?

SUMMARY: Students can learn to balance their own diets so that nutritional requirements are met.

RESOURCES

Anderson, M. M. (June, 1980). *A young person's guide to good food!* (New Mexico Cooperative Extension Service Guide E-112). Las Cruces, NM: New Mexico State Cooperative Extension Service.

Hamilton, E. M., Whitney, E. N. & Sizer, F. S. (1988). *Nutrition: concepts and controversies* (4th ed.). St. Paul: West Publishing Co.

Nutrition Curriculum
Unit 3

Digestion and Absorption

Nutrition Curriculum Unit Three

<Nutrient Assimilation ** Digestion and Absorption>

IV. Function: Demonstrate a knowledge of the digestive process and absorption.

GENERALIZATIONS:

1. Through the processes of digestion, the body turns food into usable nutrients.

2. Through the process of absorption, nutrients are delivered to the bloodstream.

3. The circulatory system delivers nutrients to body cells.

OBJECTIVES:

The student will be able to:

A. Identify the parts of the body involved in digestion.

B. Match the parts of the body involved in digestion with their functions.

C. Define mechanical and chemical digestive processes.

D. Explain the difference between mechanical and chemical digestion.

E. Explain how foods are broken down physically and chemically so that they can be absorbed.

F. Explain the absorption and transport of food particles.

G. Construct a model of the villi of the small intestine to demonstrate increased surface area.

ADDITIONAL LEARNING ACTIVITIES:

1. Define terms associated with digestion.

2. Trace the process of digestion.

ADDITIONAL RESOURCES:

Medved, E. (1988). The world of food (4th ed.). Needham, MA: Prentice - Hall, Inc. pp. 66-70.

Fleck, H. (1981). Introduction to nutrition, (4th Ed.). New York: McMillan Publishing Co. pp.88-96.

Kowtaluk, H. (1986). Discovering nutrition. Encino: Bennett & McKnight Publishing Co. pp. 43-45; 46-48.

DIGESTION

I. INTRODUCTION

A. Why do we digest foods?
  1. To get nutrients to our cells.
  2. To produce energy.

B. What does digestion mean?
  1. Definition:
     The breakdown of food so that it can be used by cells.
     a. Mechanical process in which food is broken down into smaller pieces by chewing.
     b. Chemical process in which food is broken down into simpler forms by chemicals and enzymes.
  2. The route the food takes through the digestive tract:
     a. **Mouth** - Digestion begins here through mechanical (chewing) and chemical (salivary amylase) means.
        (1) Salivary glands are located under the tongue, under the lower jaw and in front of the ears.
        (2) Saliva is a liquid that softens and moistens food. Release can be stimulated through smell, sight, or thought of food.
        (3) Salivary amylase (ptyalin) an enzyme which is in saliva, begins the break down of starch into sugar.
     b. The **Esophagus** is a tube which connects the mouth to the stomach. After swallowing, the bolus (the ball of food) moves down the esophagus by peristalsis (wave-like muscle contractions).
     c. The **Stomach** is a sac-like organ located in the chest cavity above the waistline to the left.
        (1) It produces gastric juices (hydrochloric acid and pepsinogen) which break up the food.

DIGESTION (continued)

(2) Mixing and churning of the food with juices occur (a mechanical process). Pepsin and hydrochloric acid break down the protein to amino acids. The stomach is protected by mucus secreted from the gastric glands. The final mixture is a watery, mushy substance called chyme. Liquids and carbohydrates pass relatively quickly from the stomach. Proteins take more time, and fats take the longest to pass through. Mixed meals take approximately 4 hours.

d. The **Small Intestine** is a coiled tube about 20 feet in length. It completes digestion and begins absorption. Walls of the intestines are lined with villi (finger-like projections) which increase the surface area. The villi absorb the nutrients and transport them into the blood stream. Bile is produced in the liver and stored in the gall bladder. It aids digestion by emulsifying fat. Enzymes break down protein into amino acids and starches into sugars. The sugars, fatty acids and amino acids are absorbed and carried to the liver for conversion or for storage. All nutrients pass out of the small intestine into the bloodstream to the liver and are then carried throughout the body by the blood.

e. Waste passes next into the **Large Intestine** (colon). The water that is absorbed goes into the blood stream and then goes to the kidneys. The solid waste (feces) is moved through the rectum and excreted.

3. Accessory Organs Important to Digestion

a. The **Liver** is the body's largest internal organ. An adult liver weighs three to four pounds. It receives its supply of blood from two sources. About one-fifth is oxygen-rich blood from the heart, and the other four-fifths is nutrient-rich blood from the small intestine. The liver synthesizes bile. The liver processes some of the nutrients, such as amino acids, in order to meet the special needs of individual tissues elsewhere in the body. The liver stores certain nutrients, such as vitamins, releasing them into the blood when they are

DIGESTION (continued)

required by the body. The liver also stores carbohydrates in the form of glycogen. Glycogen can be converted promptly into glucose if glucose is needed for energy by the brain, muscles, or other organs. The brain, which cannot store glucose, depends on a steady supply from the liver. The formation of glycogen is triggered by a hormone, insulin, which is secreted into the blood by the pancreas. An inability to produce insulin leads to diabetes, a disease involving excessive glucose in the blood. In addition to assisting in digestion, the liver serves many other needs of the body. For example, it breaks down old red blood cells. It also processes potential poisons for removal from the body. These include alcohol (which the liver can process in small amounts) and drugs that have served their purpose.

b. The **Pancreas** secretes the hormones insulin and glucagon into the bloodstream. It also secretes pancreatic enzymes into the small intestine which helps in the breakdown of fats, proteins, and starch.

c. The **Gall Bladder** is a small organ located under the liver. It stores bile and contracts to release bile into the Small Intestine.

d. The **Circulatory System** is a pick-up and delivery system. The plasma part of the blood carries the nutrients. Nutrients pass into the blood vessels by diffusion. This process of delivering usable nutrients from the digestive system into the blood is called absorption. The transport of nutrients from the blood to the cells is called utilization.

Nutrition Curriculum
Unit #3
Function #IV
Activity #1

NAME OF ACTIVITY: ABSORPTION

GENERALIZATION: Through the process of absorption, nutrients are delivered to the bloodstream.

OBJECTIVES: Explain the absorption and transport of food particles.
Construct a model of the villi of the small intestine to demonstrate increased surface area.

BACKGROUND INFORMATION: The teacher should have already discussed the digestive system explaining that the small intestine contains villi which increase absorption area.

DISCUSSION QUESTIONS: Which material do you think will absorb the most water?

EQUIPMENT:
small piece of deep pile carpet
(natural fiber works best)
small piece of a cloth napkin
small piece of padding used under carpet
small piece of a non-terry cloth dish towel
glass measuring cup
4 shallow bowls
water

PROCEDURES:

1. Fill each bowl with the same amount of measured water.
2. Record the amount of water in each bowl.
3. Place the sample pieces of materials in the water. Allow each a few minutes to soak up the water.
4. Take each piece of material out of the water, allowing excess water to drip in the bowl. Do not squeeze the water out of the material.
5. Measure and record the amount of water left in each bowl.

ABSORPTION (continued)

6. Which kind of material absorbed the most water?
   Was it the one you thought would absorb the most water?
   Why do you think one type of material absorbed more water than the other materials?
   What other kinds of materials have little projections used to increase absorption?

SUMMARY: The lining of the intestine is folded in order to expand surface area for absorption.

Nutrition Curriculum
Unit #3
Function #IV
Activity #1

ABSORPTION

EXPERIMENT: To study how the villi in the small intestine increase absorption capacity.

MATERIALS: small piece of deep pile carpet (natural fiber works best), small piece of a cloth napkin, small piece of padding used under carpet, small piece of a non-terry cloth dish towel, glass measuring cup, 4 shallow bowls, water

DIRECTIONS: Mark the bowls with a grease pencil, C for carpet, N for napkin, P for padding, and D for dish towel. Measure the same amount of water into each of the four dishes. Put the appropriate material into each of the dishes.

Allow material to soak in dish for two minutes. Remove material (do not squeeze or wring it out) and place on the tray. Use your glass measuring cup to determine the amount of water left in each bowl.

material	water measured	water left	amount absorbed
carpet			
napkin			
padding			
dish towel			

Which kind of material absorbed the most water? Was it the one you thought would absorb the most water? Why do you think one type of material absorbed more water than the other materials? What other kinds of materials have little projections used to increase absorption?

Nutrition Curriculum
Unit #3
Function #IV
Activity #2

NAME OF ACTIVITY:	DIFFUSION
GENERALIZATION:	Through the process of absorption, nutrients are delivered to the bloodstream.
OBJECTIVES:	Explain the absorption and transport of food particles.
BACKGROUND INFORMATION:	Refer to Unit Outline.
DISCUSSION QUESTIONS:	What do you expect to observe? Will the celery turn the color of the colored water?
EQUIPMENT:	Light colored celery (from the center of the celery stalk) Clear glasses or beakers Food coloring (red or blue) Water Long, thin, sharp skewer
PROCEDURES:	1. Cut some celery off both ends of the stick. 2. With the skewer, drill lengthwise through the inside of the celery. Do this about four times. 3. Fill the glass about one fourth of the way with water. 4. Add food coloring so that the color of the water is dark. 5. Place three celery sticks with the holes pointing down in the water and leave over night.

DIFFUSION (continued)

6. What did you observe about the outside of the celery stalk?
   Break the celery stalk in half; what do you see?
   Peel back the outer layer of the celery stalk. What do you observe?
   What does the celery stalk represent and what does the colored water represent?

SUMMARY: The purpose of the villi is to absorb the nutrients from the small intestines. The villi have their own capillary system to carry the nutrients into the blood system. Some nutrients are absorbed by a process called passive diffusion in which molecules move from an area of higher concentration to an area of lower concentration.

Nutrition Curriculum
Unit #3
Function #IV
Activity #3

NAME OF ACTIVITY:	CROSSWORD PUZZLE ON DIGESTION
GENERALIZATION:	Through the process of digestion, the body turns food into usable nutrients.
OBJECTIVES:	Identify the parts of the body involved in digestion.
BACKGROUND INFORMATION:	Refer to Unit Outline.
EQUIPMENT:	crossword puzzle dictionary
PROCEDURES:	1. Present lesson on the digestive process in class. 2. Give students the crossword puzzle as an activity to reinforce material learned during the lesson.
SUMMARY:	Crossword puzzles can reinforce students' knowledge.

CROSSWORD PUZZLE ON DIGESTION (continued)

Across:

8. - passes undigested waste to the rectum
11. - the body's reserve energy
12. - carbohydrates, fats and proteins
13. - amino acids results from the digestion of _____
15. - stores bile
16. - carbohydrates are broken down to _____

Down:

1. - this enzyme breaks down carbohydrates
2. - watery, mushy substance in the stomach
3. - most of digestion takes place here
4. - process of breaking down food into usable nutrients for our body
5. - produced from the salivary glands
6. - produces bile
7. - muscle contractions that mix and churn the food
9. - protects the lining of the stomach
10. - passes food to the stomach
14. - solid waste material

Nutrition Curriculum
Unit #3
Function #IV
Activity #3

Crossword Puzzle on Digestion

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+-----------------------------------------------------------------------+
|XXX|XXX|XXX|XXX|XXX|XXX|1. |XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|
|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|
|-----------------------------------------------------------------------|
|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|2. |XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|
|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|
|--------------------------------    -----------------------------------|
|3. |XXX|XXX|XXX|4. |XXX|   |XXX|   |XXX|XXX|5. |XXX|6. |XXX|XXX|XXX|XXX|
|   |XXX|XXX|XXX|   |XXX|   |XXX|   |XXX|XXX|   |XXX|   |XXX|XXX|XXX|XXX|
|-----------------------------------------------------------------------|
|   |XXX|7. |XXX|   |XXX|   |XXX|   |XXX|XXX|   |XXX|   |XXX|XXX|XXX|XXX|
|   |XXX|   |XXX|   |XXX|   |XXX|   |XXX|XXX|   |XXX|   |XXX|XXX|XXX|XXX|
|-----------------------------------------------------------------------|
|   |XXX|   |XXX|   |XXX|   |XXX|   |XXX|XXX|   |XXX|   |XXX|XXX|XXX|XXX|
|   |XXX|   |XXX|   |XXX|   |XXX|   |XXX|XXX|   |XXX|   |XXX|XXX|XXX|XXX|
|-----------------------------------------------------------------------|
|8. |   |   |   |   |   |   |   |   |   |   |   |   |   |   |XXX|XXX|XXX|
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |XXX|XXX|XXX|
|-----------------------------------------------------------------------|
|   |XXX|   |XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|   |XXX|9. |XXX|XXX|
|   |XXX|   |XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|   |XXX|   |XXX|XXX|
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|   |XXX|   |XXX|   |XXX|XXX|XXX|10.|XXX|11.|   |   |XXX|XXX|   |XXX|XXX|
|   |XXX|   |XXX|   |XXX|XXX|XXX|   |XXX|   |   |   |XXX|XXX|   |XXX|XXX|
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|12.|   |   |   |   |   |   |   |   |XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|
|   |   |   |   |   |   |   |   |   |XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|
|-----------------------------------------------------------------------|
|   |XXX|   |XXX|   |XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|
|   |XXX|   |XXX|   |XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|
|-----------------------------------------------------------------------|
|   |XXX|   |XXX|   |XXX|XXX|XXX|13.|   |   |   |   |   |   |   |XXX|XXX|
|   |XXX|   |XXX|   |XXX|XXX|XXX|   |   |   |   |   |   |   |   |XXX|XXX|
|-----------------------------------------------------------------------|
|   |XXX|   |XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|14.|XXX|
|   |XXX|   |XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|
|-----------------------------------------------------------------------|
|   |XXX|   |XXX|XXX|XXX|XXX|15.|   |   |   |   |   |   |   |   |   |   |
|   |XXX|   |XXX|XXX|XXX|XXX|   |   |   |   |   |   |   |   |   |   |   |
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|   |XXX|   |XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|
|   |XXX|   |XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|
|-----------------------------------------------------------------------|
|   |XXX|XXX|XXX|XXX|XXX|16.|   |   |   |   |   |   |XXX|XXX|XXX|   |XXX|
|   |XXX|XXX|XXX|XXX|XXX|   |   |   |   |   |   |   |XXX|XXX|XXX|   |XXX|
|-----------------------------------------------------------------------|
|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|
|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|   |XXX|
|-----------------------------------------------------------------------|
|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|
|   |XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|XXX|
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Nutrition Curriculum
Unit #3
Function #IV
Activity #3

Crossword Puzzle on Digestion

ANSWER KEY

Across:
8. - LARGE INTESTINES
11. - FAT
12. - NUTRIENTS
13. - PROTEINS
15. - GALLBLADDER
16. - GLUCOSE

Down:
1. - AMYLASE
2. - CHYME
3. - SMALL INTESTINE
4. - DIGESTION
5. - SALIVA
6. - LIVER
7. - PERISTALSIS
9. - MUCUS
10. - ESOPHAGUS
14. - FECES

Nutrition Curriculum
Unit #3
Function #IV
Activity #4

DIGESTION

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Q V X S M A L L I N T E S T I N E S H G D
T I I C C T R A N S V E R S E C O L O N O
H E E Z H E C A R B O H Y D R A T E S J F
D E S C E N D I N G C O L O N E D H T N A
I S E V M E B F U A E S J R U N A K U E T
G O Q N I R U V I L L I P E T Z B O L U S
E P W W C G B T A L T U N C R Y S E V H Z
S H R B A Y Q C I B N H S T I M O K D S I
T A L O L S I K P L C A I U E E R K U P N
I G N I T N I A Y A I G N M N S P X O T M
O U G D A E Y N M D N Z K U T H T S D N G
N S A H X W I O G D Q C A H S V I I E L F
O Y C K J Y T N B E U W R T I N O N N S U
M E X Y O S K W S R S S H E I A N Y U E L
M K H Q N E A S L L I T O F A O W W M P S
D I Q P V U K L Q I U L I W Q S N Y A D G
I L C I A K X B I O V D E O L P E R V T M
H C L S O C M S M V J E J U N U M U E S V
F R C U W D I Q I T A B R Z M U R Q H Y K
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Can you find these words?

LARGE INTESTINES
TRANSVERSE COLON
UTILIZATION
ESOPHAGUS
DIGESTION
CHEMICAL
JEJUNUM
SALIVA
BOLUS
ILEUM

SMALL INTESTINES
CARBOHYDRATES
MECHANICAL
PANCREAS
INGESTION
DUODENUM
STOMACH
RECTUM
MOUTH
FATS

DESCENDING COLON
GALL BLADDER
ABSORPTION
NUTRIENTS
PROTEINS
ENZYMES
ENERGY
VILLI
LIVER
ANUS

ANSWER KEY:

DIGESTION

```
q v x S M A L L I N T E S T I N E S h g d
t i i c C T R A N S V E R S E C O L O N o
h e e z H E C A R B O H Y D R A T E S j F
D E S C E N D I N G C O L O N E d h t n A
I S e v M E b f u A E s j R U N A k u e T
G O q n I R U V I L L I p E T Z B O L U S
E P w w C G b T A L t u N C R Y S e v h z
S H R b A Y q C I B n H s T I M O k D s i
T A l O L s I k P L C A i U E E R k U p n
I G n i T N I a y A I g N M N S P x O t m
O U g d A E y N M D N Z k U T h T s D n g
N S a H x w I O G D q C A h S v I I E l f
o y C k j y T N b E u w R T i n O n N s u
m E x y o S k w S R S s H E I a N y U E l
M k h q n e A s L l I T o f A O w w M p S
d i q p v u k L q I U L I w q S N y a d g
i l c i a k x b I O V d E O l p E r v t m
h c l s o c m s M V J E J U N U M u e s v
f r c u w d i q i t A b R z M u r q h y k
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Nutrition Curriculum
Unit #3
Function #IV
Activity #5

NAME OF ACTIVITY: MOTILITY WITHIN THE SMALL INTESTINES

GENERALIZATION: Through the processes of digestion, the body turns food into usable nutrients.

OBJECTIVES: Match the parts of the body involved in digestion with their functions.
Define mechanical and chemical digestive processes.

BACKGROUND INFORMATION: Extending from the stomach to the large intestine, the small intestine is the longest part of the gastrointestinal tract. In an average adult, it is coiled and folded so as to fit compactly into the abdomen. The first section of the small intestine, the duodenum, is a C - shaped segment about a foot long. The middle section is called the jejunum, and the final section is the ileum. Peristalsis is the series of wave-like contractions.

DISCUSSION QUESTIONS: Did the amount of air you blew into the balloon move to the end of the balloon easily and on its own?
What action did your hand imitate to move the air to the end of the balloon?

EQUIPMENT: Long balloon (thin), clock

PROCEDURES:

1. Blow a little air into the balloon and tie the end.
2. Using your hands move the bubble of air to the end of the balloon.
3. Record how long it takes you to do this.

SUMMARY: The small intestine contracts, producing peristaltic waves. These waves proceed in the direction of the large intestine. This wave-like action is necessary for moving food down the gastrointestinal tract and for circulating material within the lumen of the tract.

Nutrition Curriculum
Unit #3
Function #IV
Activity #6

NAME OF ACTIVITY:	SURFACE AREA OF THE VILLI
GENERALIZATION:	Through the process of absorption, nutrients are delivered to the bloodstream.
OBJECTIVES:	Construct a model of the villi of the small intestine to demonstrate increased surface area.
BACKGROUND INFORMATION:	Refer to Unit Outline.
DISCUSSION QUESTIONS:	Which has the most surface area- a flat surface or an indented surface? What advantage is the greater surface area?
EQUIPMENT:	Rubber gloves, scissors, rulers, pencil and paper, handout entitled "Surface Area of the Villi."
PROCEDURES:	1. Cut off the finger portion of a rubber glove. Each group gets one finger. 2. One member of the group will measure the size of the opening and determine its area. 3. One member cuts the glove finger so that it will lie flat and estimates the area of the finger.
SUMMARY:	Digested food diffuses into the blood through the wall of the small intestine. The lining of the small intestine is covered with thousands of small, finger-like projections called villi. Area is width x length. Villi increases the surface area within the small intestine 700-1000 fold.

Nutrition Curriculum
Unit #3
Function #IV
Activity #6

SURFACE AREA OF THE VILLI

Directions: The teacher will have a cut portion of a rubber glove for your group. You are to compare the surface area of the area where you cut the extension of the finger to the actual area of the extension itself.

1. Cut off the finger extension.

2. Measure the area of the cut out from the extension.

3. Cut the extension so that it will be flat. Determine the area of the flattened extension.

4. Which has the most surface area A or B? Why?

5. Why does the villi need this additional surface area?

Nutrition Curriculum
Unit #3
Function #IV
Activity #7

NAME OF ACTIVITY: HOW DOES BILE CHANGE FAT?

GENERALIZATION: Through the processes of digestion, the body turns food into usable nutrients.

OBJECTIVES:

Define mechanical and chemical digestive processes.
Explain the difference between mechanical and chemical digestion.
Explain how foods are broken down physically and chemically so that they can be absorbed.

BACKGROUND INFORMATION:

Bile is produced in the liver and stored in the gall bladder. It is carried to the small intestine by the bile duct. The gall bladder is a greenish-colored bag attached to the liver. Bile does not contain enzymes, but it does perform a vital function. It breaks down fats into tiny particles. This increases the surface area of the fats and speeds their digestion. Bile also makes the interior of the intestine alkaline, or basic.

DISCUSSION QUESTIONS:

What happens after the oil is added to the water?
About how long does it take for the oil to rise to the surface after you shake the test tube?
Compare the size of the droplets of oil in each test tube.
Does bile change fats chemically?
What is the function of bile?

EQUIPMENT:

3 test tubes
labels
vegetable oil
2 droppers
3 stoppers (to fit the test tubes)
test tube rack
sodium bicarbonate ($NaHCO3$) baking soda
flat toothpick
graduated cylinder (10 ml)
water
bile solution (5%)
clock or watch

HOW DOES BILE CHANGE FAT? (continued)

PROCEDURES:

1. Label three test tubes A, B, and C. Place them in a test tube rack. Measure 10 ml of water into a graduated cylinder. Pour the water into test tube A. Repeat this procedure for test tubes B and C.
2. Add 3 drops of vegetable oil to each test tube.
3. Scoop up some sodium bicarbonate with a flat toothpick. Add this amount of sodium bicarbonate to tube B.
4. Using a clean dropper, add 5 drops of 5% bile solution to tube C.
5. Place a stopper in each test tube and shake each five times to mix the contents.
6. Allow the test tubes to stand for 10 minutes. Observe any changes.

SUMMARY:

It takes only a short time for tube A to separate, longer for tube B, and longest for tube C.
The oil droplets are larger in A, smaller in B, and too small to be observed in C.
Bile does not change fat, it divides fat into smaller particles. Enzymes are needed to change fats chemically. Bile is not an enzyme.

Nutrition Curriculum
Unit #3
Function #IV
Activity #8

NAME OF ACTIVITY: ANATOMY OF THE GASTROINTESTINAL TRACT

GENERALIZATION: Through the processes of digestion, the body turns food into usable nutrients.

OBJECTIVES:
Identify the parts of the body involved in digestion.
Match the parts of the body involved in digestion with their function.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
What parts of the body are involved in the digestion and absorption processes?
What role does each part of the digestive tract play in the process of digestion and absorption?

EQUIPMENT:
Wall poster or overhead transparency of the digestive tract
handout drawing of the digestive tract

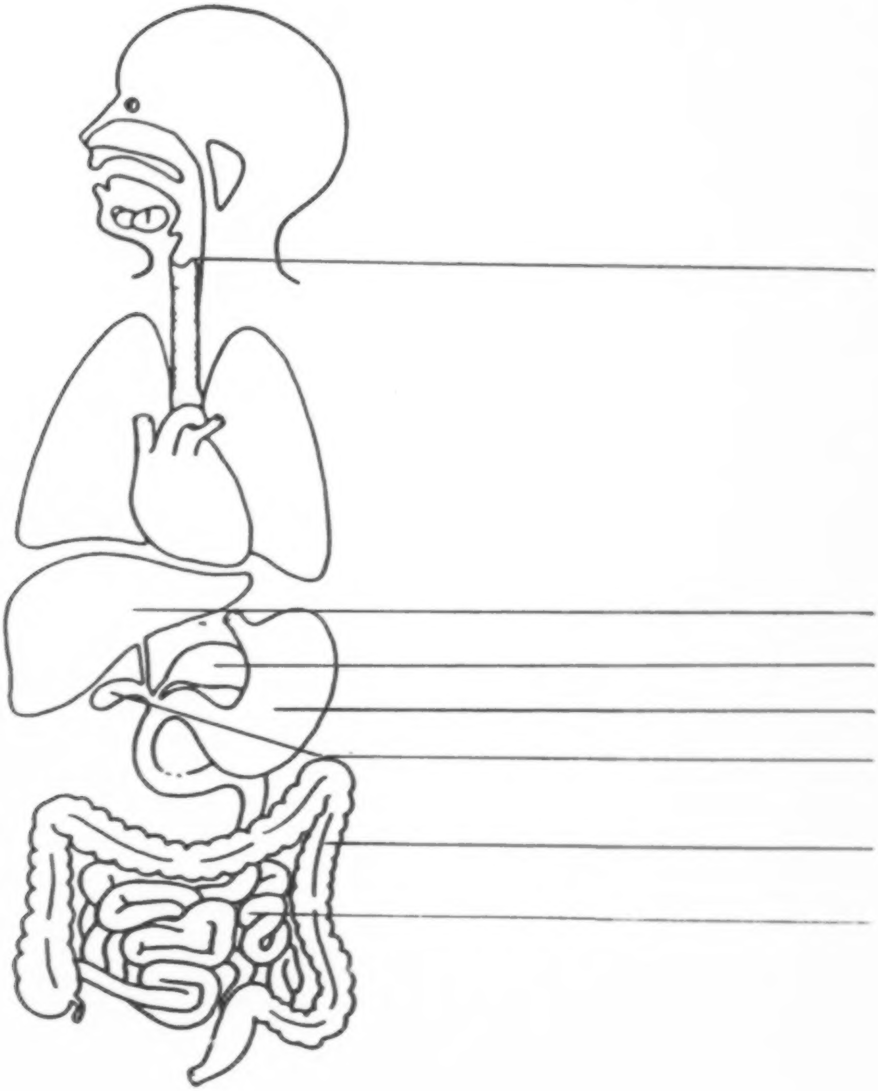
PROCEDURES:

1. Give students diagrams to label.
2. Present lesson on the anatomy of the gastrointestinal tract.
3. Describe the basic function of each organ in the gastrointestinal tract.

SUMMARY: By delineating functions of the different organs in the process of digestion, students can reach a better understanding of the digestion process as a whole.

ANATOMY OF THE GASTROINTESTINAL TRACT

Directions: Label the organs of the digestive system.



Nutrition Curriculum
Unit #3
Function #IV
Activity #9

NAME OF ACTIVITY: ANATOMY OF THE MOUTH, PHARYNX, AND ESOPHAGUS

GENERALIZATION: Through the processes of digestion, the body turns food into usable nutrients.

OBJECTIVES: Identify the parts of the body involved in digestion.
Match the parts of the body involved in digestion with their functions.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

What processes of digestion occur in the upper gastrointestinal tract?
How do the structures found in the upper gastrointestinal tract facilitate digestion?

EQUIPMENT: Handout of upper GI tract anatomy
Wall poster or overhead transparency of upper GI tract anatomy.

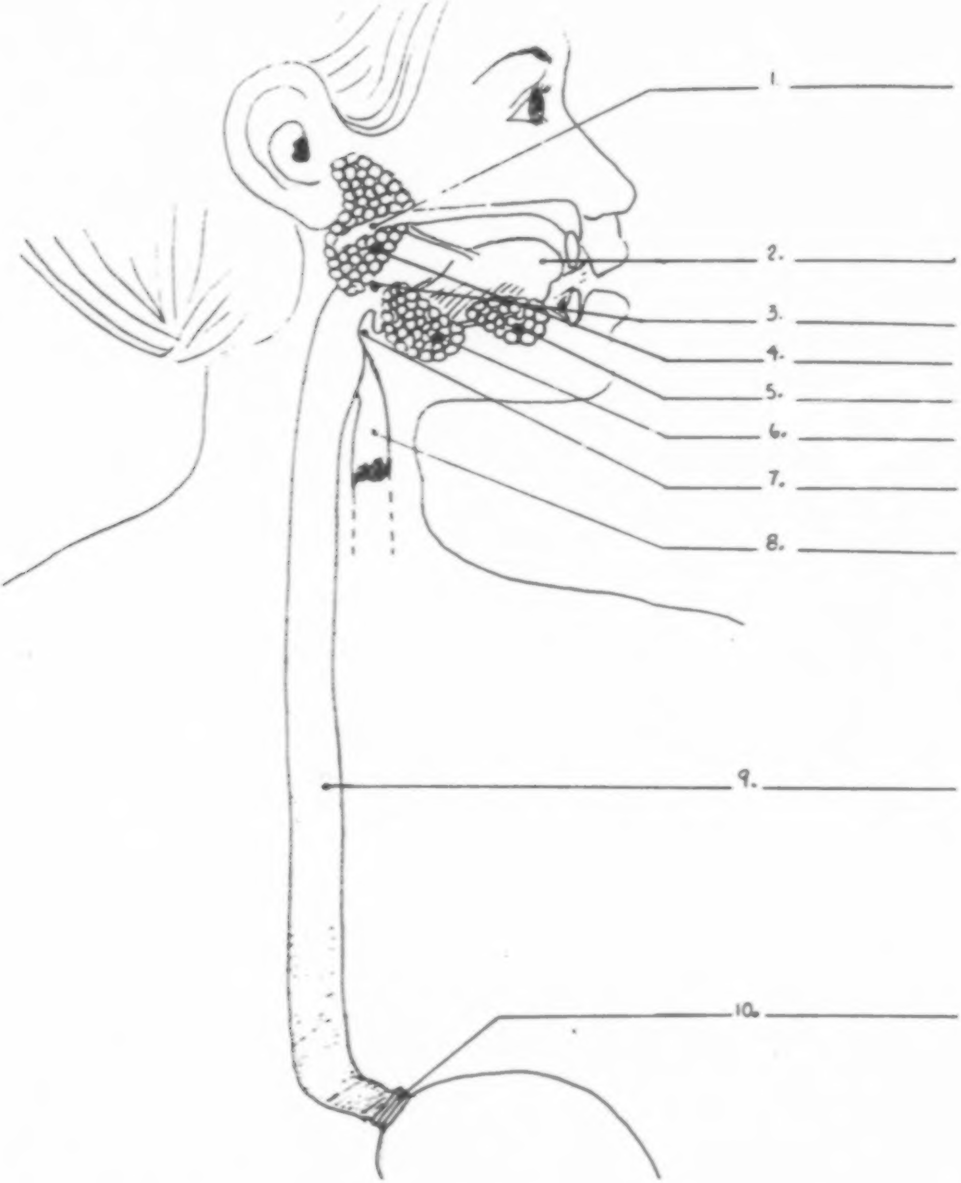
PROCEDURES:

1. Provide GI tract anatomy diagram for students.
2. Students should label the different parts of the GI tract.

SUMMARY: Matching the parts of the body with their names reinforces the learning of the digestion process.

ANATOMY OF THE MOUTH, PHARYNX, AND ESOPHAGUS

Directions: Label the upper part of the digestive system.



Nutrition Curriculum
Unit #3
Function #IV
Activity #10

NAME OF ACTIVITY: DIGESTION AND ABSORPTION:
DOES SALIVA CHANGE STARCH TO SUGAR?

GENERALIZATION: Through the processes of digestion, the body turns food into usable nutrients.

OBJECTIVES: Define mechanical and chemical digestive processes.
Explain the difference between mechanical and chemical digestion.

BACKGROUND INFORMATION: Even before a bite is taken, the smell and sight of appetizing food begins the process of digestion. The salivary glands start producing the digestive juices called saliva, and the mouth waters. Teeth chop and grind the food into smaller pieces. The tongue mashes the food against the hard palate (the roof of the mouth) in order to mix it with saliva. Saliva adds water and mucus to the food. Mucus smooths the passage of food through the digestive tract. Saliva also contains an enzyme called amylase, which begins the chemical breakdown of the carbohydrates in your food. This breakdown turns starch into simple sugars such as glucose.

DISCUSSION QUESTIONS:

Does the unchewed cracker contain starch?
Does the unchewed cracker contain sugar?
Does the chewed cracker contain sugar?
How does saliva change the cracker?

EQUIPMENT:

graduated cylinder (10ml)
iodine solution
Benedict's solution
dropper
3 test tubes
beaker (large)
hot plate
clock with a second hand
soda crackers
water

DIGESTION AND ABSORPTION: DOES SALIVA CHANGE STARCH TO SUGAR? (continued)

PROCEDURES:

1. Crumble a soda cracker and put one fourth of it in a test tube. Put another fourth in a second test tube.
2. Add 3 ml of water to each test tube. (Use a graduated cylinder to measure this amount.) Mix by rotating the tubes between the palms of your hands.
3. Add 4 drops of iodine sclution to one of the test tubes. Observe and record any color change. (See chart at the end of procedures.)
4. Add 5 ml of Benedict's solution to the other test tube. Observe and record the color.
5. Fill a large beaker three-fourths full of water. Place the beaker on a hot plate. When the water is hot, place the test tube in water for five minutes. Observe and record any color change.
6. Chew another soda cracker for 60 seconds. Place the chewed cracker in the third test tube.
7. Add 5ml of Benedict's solution. Observe and record that color.
8. Heat the test tube in the water bath for 5 minutes. Observe and record any color change.

SUMMARY: The iodine solution changes from a reddish-brown solution to blue-black, indicating the presence of starch. The Benedict solution changes from blue to green (or orange), indicating the presence of sugar.

DIGESTION AND ABSORPTION: DOES SALIVA CHANGE STARCH TO SUGAR?

DATA:

CONTENTS OF THE TEST TUBE	RESULTS
Unchewed cracker and iodine solution	
Unchewed cracker and Benedict's solution	
Chewed cracker and Benedict's solution	

Does saliva change starch to sugar?

Nutrition Curriculum
Unit #3
Function #IV
POST TEST

Digestive System Quiz

1. Name the three main organs in the digestive system.
______________ ______________ ______________.

Name the three organs which aid the digestive process.
______________ ______________ ______________.

2. The mechanical process of the digestive system begins
   a. when one smells food
   b. when salivary glands start producing saliva
   c. when one bites and chews food
   d. when the saliva and food begin to mix

3. Bile is produced in the ____________________ and stored in the ____________________.

4. Bile is used to break down ________________.

5. Name the three energy-providing nutrients of food.
____________________, ____________________, and ____________________.

6. Protein is broken down into ____________________.

7. Number these sentences in the correct sequence of events.
   _____ Food moves into the small intestines.
   _____ Gastric juices continue digestion.
   _____ Food is mixed with bile and pancreatic juices.
   _____ Saliva mixes with food.
   _____ Undigested food moves into the large intestines.

8. When the food is swallowed and goes down the esophagus it is called the:
   a. chyme
   b. bolus
   c. mucosa
   d. peristalsis

9. Glucose that is not immediately needed for energy by the body is:
   a. passed on through the rectum
   b. stored as fat in the body
   c. sent to the brain to help us think
   d. stored in the gall bladder

10. Most of the digestion is done in the ______________.

Digestive System Quiz (continued)

11. True or False: People can live very well without a colon.

12. The salivary glands are located ____________________________.

13. Match the following:

_____ churns and mixes the food
_____ food in the stomach
_____ transports nutrients through the body
_____ break down of food
_____ protects the lining of the stomach

a. ingestion
b. chyme
c. mucus
d. peristaltic waves
e. blood
f. digestion

14. The walls of the small intestine are lined with ___________ to increase the absorption area.

15. Match the letter from the diagram to the name at the left.

_____ esophagus
_____ gall bladder
_____ stomach
_____ small intestines
_____ colon
_____ liver
_____ pancreas
_____ rectum

Digestive System Quiz (continued)

Answer Key

1. stomach, small intestine, large intestines
   liver, pancreas, gall bladder

2. c

3. liver, gall bladder

4. fat

5. proteins, fats, carbohydrates

6. amino acids

7. 3
   2
   4
   1
   5

8. b

9. b

10. small intestines

11. true

12. under the tongue

13. D
    B
    E
    F
    C

14. villi

15. A
    G
    B
    D
    F
    H
    C
    E

RESOURCES

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Nutrition Curriculum
Unit 4

Food Science

Nutrition Curriculum Unit Four

<Food Science>

V. Function: Identify environmental factors and their effects on food.

GENERALIZATIONS:	**OBJECTIVES:**	**ADDITIONAL LEARNING ACTIVITIES:**	**ADDITIONAL RESOURCES:**
1. Differences in altitude and barometric pressure affect food preparation.	The student will: A. Explain the effects of altitude on food preparation. B. Explain how temperature and humidity affect food preparation.	1. Science experiments: (Altitude) 2. Gas densities 3. Properties of Gases: Pressure and suction 4. Temperature and Pressure Relationships 11. The Effect of Pressure on Boiling Point 2. Science Experiments: (Humidity) 15. Effect of Temperature on Solubility. 17. Supersaturation and Crystallization 3. Effects of humidity on egg cookery, sugar. 4. Effects of temperature on yeast growth.	Summerlin, L.R., & Ealy, J.L., Jr. (1987). Chemical demonstrations: A sourcebook for teachers (Vol. 2). Washington, D.C.: American Chemical Society.

HIGH ALTITUDE AND FOOD PREPARATION

I. General Information

A. Definition
1. Normal elevation - sea level to 3500 feet elevation.
2. High elevation - 3500 feet and above.

B. Specifics
1. Sea level - atmospheric pressure is 14.7 lbs/sq in.
2. 5,000 ft altitude - 12.28 lb/sq in.
3. 10,000 ft altitude - 10.2 lb/sq in.
4. Air molecules are more closely packed at sea level due to gravity.
5. Due to less air pressure at higher altitudes, water boils at a lower temperature.
6. At sea level, water boils at 212 degrees Fahrenheit, (100 degrees C.) and with each 500 foot increase in altitude the boiling point drops 1 degree Fahrenheit.
7. High altitude affects the cooking of eggs, candy, baked potatoes, and vegetables.

II. High Altitude in Cooking

A. Most parts of the United States are below 3500 ft in elevation. That is why most recipes are produced with "sea level" equivalents.

B. Since atmospheric pressure is lower at high altitudes, the leavening gases in baked products have less resistance pressing against them, and products tend to over expand. Mostly, this affects the early part of baking.

C. General corrections in high altitude recipes -
1. Decrease amounts of leavening agent.
2. Strengthen the cell walls by:
   a. Decreasing the sugar and/or
   b. Adding more flour.
3. Increase liquid to counteract the greater loss due to evaporation at high altitudes.
4. Increase oven temperatures.

D. Preparation methods that cause problems -
1. Boiling
2. Leavening

HIGH ALTITUDE AND FOOD PREPARATION (continued)

III. Altitude Adjustments - Adjustments Made for Time Temperatures and/or Ingredients

A. Adjusting cake recipes
  1. Measure ingredients carefully and accurately.
  2. Substitutions may cause undesirable results.
  3. Lower atmospheric pressure may cause the cake to rise too quickly. Cell structure then overexpands before the cake sets.
     Possible results:
     a. Coarse texture
     b. Cell walls over expand & break
     c. Middle caves in
     d. Cake spills over the rim of the pan
  4. Corrections -
     Adjust baking temperature and one or more of the following:
     a. Decrease baking powder.
     b. Decrease baking soda.
     c. Decrease sugar.
     d. Increase liquid.
     e. Increase fat.
  5. Benefits of increasing baking temperature 15-25 degrees Fahrenheit.
     a. Helps to set batter before the cells formed by the leavening agents overexpand.
     b. Also helps correct lighter crust color caused by faster moisture evaporation.

B. Adjustment for foods cooked in water or steam at higher altitudes - Water boils at a lower temperature. Thus, it takes longer for foods cooked in liquids to become tender at high altitudes.
  1. Cooking time increases by 4-11%/1000 ft.
  2. Pressure cooking will aid in high altitude cooking. Increased pressure raises the temperature at which water boils, and foods cook more quickly.

C. Adjusting quick bread recipes
  1. Quick breads can be baked at high altitudes with little or no change because of their firmer structure.
  2. Using less baking powder or soda usually improves texture and prevents bitter or alkaline after taste.
  3. Less baking soda or powder also improves quick bread if it has a porous, sugary crust.

HIGH ALTITUDE AND FOOD PREPARATION (continued)

4. Using less baking powder and/or baking soda may improve quick bread if it has a coarse, gummy or oily texture, or a low volume per unit weight.

D. Adjusting candy, syrup, and jelly recipes
   1. Facts
      a. At sea level, water boils at 212 degrees Fahrenheit.
      b. Just as water boils below 212 degrees Fahrenheit at higher altitudes, other liquids also boil at a lower temperatures.
      c. Longer boiling causes loss of more moisture through evaporation.
      d. The lower the boiling point, the earlier moisture evaporation begins.
   2. Sugar mixtures (candy, jellies, or syrups) can become too concentrated due to faster loss of water, and, as a result, may become sugary or hard.
   3. To cook -
      a. Syrup should be cooked at lower temperature than sea level recipes.
      b. Use a candy thermometer.
         (1) Calculate use for high altitude reading.
         (2) Cold water test may be used to determine doneness.
         (3) For jellies, use "sheet" test to determine doneness.

E. Adjusting cookie recipes
   Many sea level cookie recipes are acceptable at high altitude but may be improved by -
   1. Increasing the oven temperature 15-25 degrees Fahrenheit.
   2. Decreasing the amount of baking soda or powder by 1/8 teaspoon to eliminate soapy aftertaste.
   3. Decreasing the amount of sugar.
      a. Many recipes carry more sugar and fat than necessary.
      b. For more nutritious cookies, replace up to 1/4 the sugar called for with nonfat dry milk.

F. Adjusting pudding and cream pie filling recipes
   1. Below 5000 ft, use double boiler when preparing custard-type foods.
   2. Above 5000 ft, the temperature in the top of a double boiler is not high enough for maximum thickening of the cornstarch.

HIGH ALTITUDE AND FOOD PREPARATION (continued)

3. Using direct heat (above 5000 ft.) will achieve better results when preparing custard-type foods.
4. Do not overcook -
   A watery substance may result, or starch mixture will be broken down (syneresis and retrogradation).

G. Adjusting deep-fat frying temperatures
   Temperature of fats must be lowered at high altitudes; lower frying temperature 3 degrees/1000 ft. in elevation above sea level.

H. Adjusting yeast bread recipes
   1. At first, add only 1/3 of the flour called for in the recipe to the liquid ingredients. At higher altitudes, flour tends to be drier and absorbs more liquid.
   2. Then add 1/2 cup of flour at a time till a soft dough results--one that pulls away from the sides of the bowl.
   3. Rising time is also affected.
      a. Leavening gases expand more quickly.
      b. The higher the altitude, the shorter the time required for the dough to rise.
      c. Rising step is necessary for good flavor and light texture, but to prevent over-fermentation:
         (1) Use less yeast or
         (2) Let dough rise twice before shaping.
      d. Do not allow the dough to rise more than double in size or
         (1) Over fermentation may occur.
         (2) Coarse, open-texture bread with a yeast-like flavor will result.
      e. Over 3500 ft., increase baking temperature 25 degrees Fahrenheit. Higher temperature
         (1) Sets the cell walls quicker.
         (2) Prevents further rising.
         (3) Prevents dough from becoming too light.

HIGH ALTITUDE AND FOOD PREPARATION (continued)

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THE EFFECT OF HUMIDITY ON FOOD PREPARATION

I. Facts About Humidity

- A. Definition - moisture in the air
- B. On sunny days, a high atmospheric pressure prevails (and low humidity).
- C. On stormy days, a low atmospheric pressure prevails (and high humidity).
- D. On stormy days, the boiling point of water will be 1-2 degrees F. lower.
- E. Boiled food will take longer to cook on a stormy day.

II. Application

- A. To boil food on humid days, higher temperature is necessary.
- B. Cook 1-2 degrees Fahrenheit higher than on sunny days.
- C. "Good candy weather" is on a fair, dry, cool day.

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|
v  = air molecules
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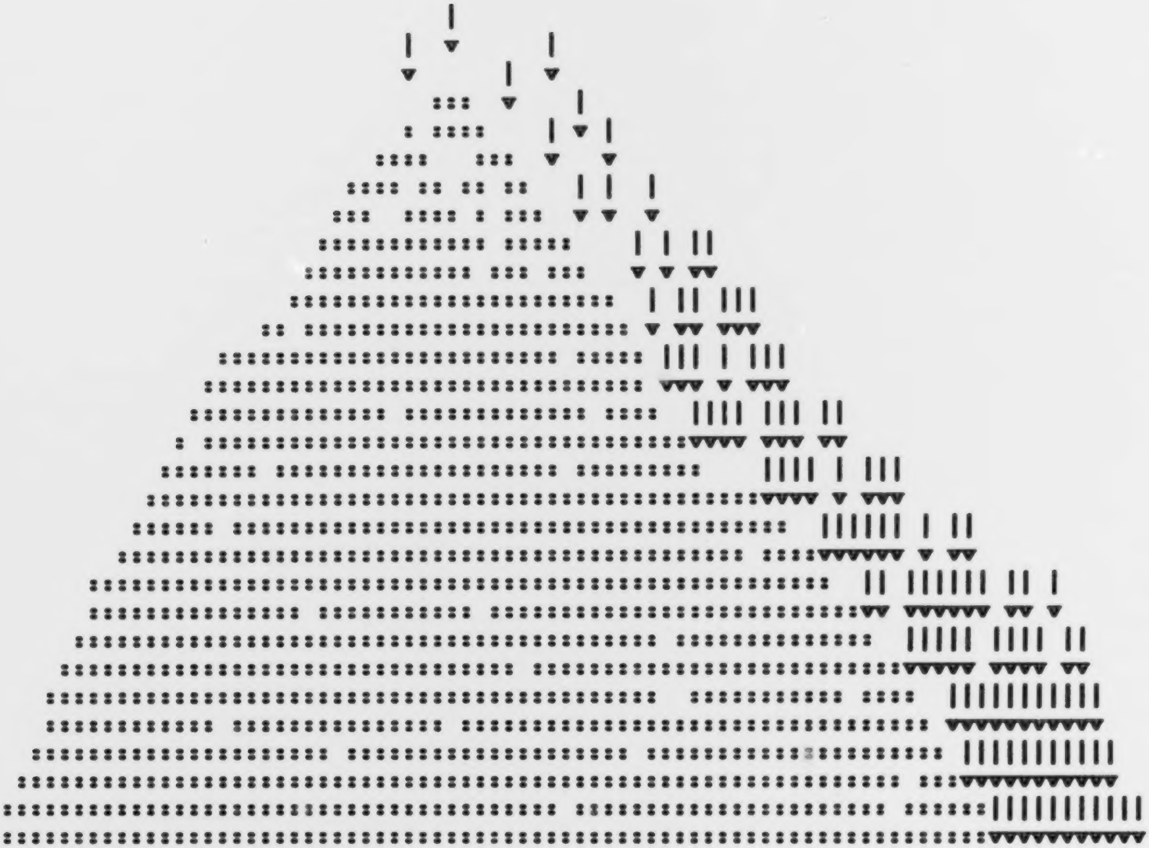

At the top of the mountain (100,000 feet above sea level), air molecules equal 10.2 lbs/sq inch.

At the bottom of the mountain, air molecules equal 14.7 lbs/sq inch.

Air molecules are more compact at the bottom due to pressure applied towards the earth.

Nutrition Curriculum
Unit #4
Function #V
Activity #1

NAME OF ACTIVITY: EFFECT OF ALTITUDE ON BOILING POINT (demonstration)

GENERALIZATION: Differences in altitude and barometric pressure affect food preparation.

OBJECTIVES: Explain the effects of altitude on food preparation.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

How does the boiling temperature of water change in response to changes in altitude?
What is barometric pressure?
What is the baseline altitude?
What is considered high altitude for canning purposes?
What are some areas of the state that are high altitude?
What is the effect of high altitude on the boiling point temperature of water?
How does temperature of processing effect canned goods?

EQUIPMENT:

glass saucepan with lid
1/2 cup distilled water
candy thermometer
graph paper
range top

OPTIONAL:
pressure canner with maximum thermometer

PROCEDURES:

1. Fill glass saucepan with 1/2 cup of distilled water.
2. With candy thermometer, note the temperature of the water when it comes to a boil.
3. Compare this boiling temperature with the boiling point at sea level, 212 degrees Fahrenheit. Have students calculate the approximate altitude. Altitude is equal to: (212 - actual boiling temperature) X 500 ft/degree.

EFFECT OF ALTITUDE ON BOILING POINT - (continued)

4. Continue boiling the water and take the temperature of the boiling water at 5 and 10 minutes after the water started boiling.
5. Hold the lid over the saucepan and determine if this affects boiling temperature.
6. Have students graph the relationship between boiling point and altitude of various locations in New Mexico.
7. Have students graph the relationship between time elapsed and boiling temperature.
8. OPTIONAL: Demonstrate the use of a maximum thermometer in a pressure canner.
   What happens to the boiling temperature as pressure builds up?
   Should there be modifications for high altitude when canning vegetables?
   If so, what are they?
   Why are those modifications important?
9. Follow-up questions:
   How will these factors affect overall food preparation?
   What types of food preparation are affected by changes in altitude?
   Does increased boiling time affect boiling temperature?
   Why does holding the lid over the saucepan affect boiling temperature?

SUMMARY: Water at sea level boils at 212 degrees Fahrenheit. Altitude above sea level decreases the temperature at which water boils. Increasing pressure within the pot increases the temperature at which boiling occurs.

Nutrition Curriculum
Unit #4
Function #V
Activity #1

A GRAPH WHICH REPRESENTS THE TEMPERATURE AT WHICH WATER BOILS AT VARIED ALTITUDES

Altitude
in Feet
8000-

7000-

6000-

5000-

4000-

3000-

2000-

1000-

203 204 205 206 207 208 209 210 211 212
FAHRENHEIT TEMPERATURE

A BAR GRAPH REPRESENTING THE RELATIONSHIP BETWEEN TIME LAPSE AND THE TEMPERATURE OF BOILING WATER

Lapse time

Time at which
water reaches
boiling point

5 minutes after
water reaches
boiling point

10 minutes after
water reaches
boiling point

204 206 208 210 212 214
FAHRENHEIT TEMPERATURE

ELEVATIONS OF TOWNS IN NEW MEXICO

City/Town	Elevation (ft.)
Alamogordo	4,350
Albuquerque	5,000
Carlsbad	3,100
Chama	7,900
Cloudcroft	8,650
Clovis	4,300
Deming	4,300
Espanola	5,600
Farmington	5,400
Gallup	6,500
Hobbs	3,650
Las Cruces	3,900
Lordsburg	4,250
Los Alamos	7,400
Lovington	3,900
Portales	4,010
Rio Rancho	5,290
Roswell	3,600
Santa Fe	7,000
Silver City	5,900
Socorro	4,600
Taos	7,000
Truth or Consequences	4,250
Tucumcari	4,100
Tularosa	4,500

Nutrition Curriculum
Unit #4
Function #V
Activity #2

NAME OF ACTIVITY: ALTITUDE VARIATIONS OF CAKE RECIPES

GENERALIZATION: Differences in altitude and barometric pressure affect food preparation.

OBJECTIVES: Explain the effects of altitude on food preparation.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

Which altitude adjustment would be appropriate for your area?
Did the altitude adjustments affect taste or texture of your cake?

EQUIPMENT:

oven
cake pans
mixing bowls
measuring spoons
measuring cups
liquid measuring cup
straight edge spatula
flour
sugar
fat
salt
eggs
baking powder/soda
liquid (milk)

PROCEDURES:

1. Hand out & study basic butter cake recipe.
2. Discuss altitude adjustments. Assign each kitchen a different alt. adjustment. (Control, 3000FT, 5000FT, 7000FT)
3. Make basic recipe according to directions, adding altitude adjustments as necessary.
4. Compare and evaluate finished products for appearance, taste, and texture.
5. Conclude which altitude adjustment would be best for your elevation.

SUMMARY: In general, when baking at high altitudes, the amounts of baking powder and sugar are reduced; liquid and baking temperature are increased. Only repeated experiments with each recipe can determine the most successful proportions to use.

ALTITUDE VARIATIONS ON CAKE RECIPES
High altitude adjustments for cakes

ADJUSTMENTS	3,000FT.	5,000FT.	7000FT.
Reduce baking powder for each tsp. decrease	1/8 tsp.	1/8-1/4 tsp.	1/4 tsp.
Reduce sugar, for each cup, decrease	0-1 T.	0-2 T.	1-3 T.
Increase liquid, for each cup, add	1-2 T.	2-4 T.	3-4 T.

Increase baking temperature 15-25 degrees Fahrenheit

Evaluation of cakes -
Place a +, /, or - for each of the cakes to designate excellent, good, of poor products, respectively.

Characteristics	Control	3,000 ft	5,000ft	7,000ft
Volume				
Shape				
Color of Crust				
Texture				
Flavor				

Nutrition Curriculum
Unit #4
Function #V
Activity #3

NAME OF ACTIVITY: THE EFFECT OF HUMIDITY HAS ON CANDY COOKING (DIVINITY)

GENERALIZATION: Differences in altitude and barometric pressure affect food preparation.

OBJECTIVES: Explain how temperature and humidity affect food preparation.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

Does the atmospheric pressure have any affect on making candy?

Which type of weather would be most conducive to candy making, a fair or stormy day?

EQUIPMENT:

surface burner
saucepan
measuring cups
 (liquid & dry)
measuring spoons
straight-edge spatula

sugar
white corn syrup
water
vanilla
salt
egg whites

PROCEDURES:

Day 1 - Fair, dry day

1. Hand out, and reduce by half the basic divinity recipe.
2. Discuss humidity's effect on most candies. Have class make high altitude adjustments as necessary.
3. Make a hypothesis as to the effect of adjustments on the product.
4. Make basic recipe according to directions.
5. Evaluate finished product for appearance, taste, and texture.

Day 2 - Stormy, humid day

Repeat steps 1-5 (same as day one)

6. Compare the products from days 1 & 2.
7. Draw conclusions regarding effects of varying atmospheric pressures on product characteristics.

Note : Humid days may be simulated by boiling several pans of water in the kitchen on the day of the experiment.

THE EFFECT OF HUMIDITY HAS ON CANDY COOKING
(continued)

SUMMARY: Boiled food will take longer to cook on a stormy day. This is due to the low atmospheric pressure that prevails on high humidity days. During these times, the boiling point will be 1-2 degrees F. lower. For a recipe to be a success, adjustments will need to be made. To boil food on humid days, higher cooking temperatures are necessary. One needs to cook 1-2 degrees Fahrenheit higher than on sunny days. "Good candy weather" is on a fair, dry, cool day.

Nutrition Curriculum
Unit #4
Function #V
Activity #4

NAME OF ACTIVITY: ATMOSPHERIC HUMIDITY AND ITS EFFECT ON FOOD DEHYDRATION

GENERALIZATION: Differences in altitude and barometric pressure affect food preparation.

OBJECTIVES: Explain how temperature and humidity affect food preparation.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

Does fruit contain water? (Squeeze watermelon or tomatoes to show water content.)
Can the water in fruit be removed? Replaced?
Compare methods of controlling or avoiding humidity to aid in the dehydration process.

EQUIPMENT:

fruit
blender
knives
water
sugar
oven
dehydrator
shallow pans
saucepan
plastic wrap
cheese cloth
lemon juice
cellophane tape

PROCEDURES:

1. Divide class into three groups. Each group will be assigned one of the following dehydration processes: sun drying, drying in a dehydrator and oven drying.
2. Prepare fruit leather as described in Extension Bulletin E-315 following directions for one of the three processes.
3. Record time lapses and temperatures used.
4. Rehydrate fruit leather or dried fruit.
5. Follow-up questions:
   Compare the methods used for dehydrating fruit leather.
   Which method affects humidity?
   Which method is most changed by humidity?
   What are the variables involved in food dehydration (heat, air movement, humidity levels)?

ATMOSPHERIC HUMIDITY AND ITS EFFECT ON FOOD DEHYDRATION (continued)

5. Follow-up questions:
   Which variable (air circulation, fan, heat) has the most effect on decreasing humidity, therefore, dehydrating the leather?
   When would the other methods be most acceptable (expense, time constraints, availability of materials)?

SUMMARY: Food contains water and can be preserved by removing water. Dehydration time is increased with increased atmospheric humidity. Air circulation decreases humidity and, therefore, dehydration time. Sun drying is more time consuming than oven or dehydrator drying.

Nutrition Curriculum
Unit #4
Function #V
Activity #4

ATMOSPHERIC HUMIDITY AND ITS EFFECT ON FOOD DEHYDRATION

FRUIT LEATHER MADE BY SUN DRYING

HOURS
TEMPERATURE

TOTAL HOURS

HOURS
TEMPERATURE

HOURS
TEMPERATURE

AVERAGE TEMPERATURE

HOURS
TEMPERATURE

FRUIT LEATHER MADE BY OVEN DRYING

HOURS
TEMPERATURE

TOTAL HOURS

HOURS
TEMPERATURE

AVERAGE TEMPERATURE

HOURS
TEMPERATURE

FRUIT LEATHER MADE IN A DEHYDRATOR

HOURS
TEMPERATURE

TOTAL HOURS

HOURS
TEMPERATURE

AVERAGE TEMPERATURE

RESOURCES

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Nutrition Curriculum Unit Four

<Food Science>

VI. Function: Demonstrate knowledge of the effects of food preparation methods on food acceptability and nutrient content.

GENERALIZATIONS:	**OBJECTIVES:**	**ADDITIONAL LEARNING ACTIVITIES:**	**ADDITIONAL RESOURCES:**
1. Food components are affected by preparation methods.	The student will: A. Demonstrate knowledge of appropriate use of food preparation methods such as baking, broiling, braising, microwaving, pressure cooking, steaming. B. Perform different food experiments to see how protein is affected by varying moisture, acid, temperature, enzymes, etc. C. Identify functions of food components in recipes.	1. Beat egg whites into meringues to show how proteins are denatured, Science Experiments You Can Eat, p. 58. 2. Coagulation experiments.	Cobb, V. (1972). Science experiments you can eat. New York: Lippincott Co.

EFFECT OF FOOD PREPARATION METHODS ON PROTEINS

I. Definition and Detection of Protein in Food

A. Proteins are organic compounds characterized by the presence of nitrogen.

B. Structurally, proteins contain carbon, oxygen, hydrogen, nitrogen, and sometimes sulfur.

C. The presence of protein can be detected by the addition of Biuret solution, which will turn purplish-blue in the presence of protein.

II. Proteins in Milk

A. Various proteins, including enzymes, are in colloidal state in milk.

B. Major protein fractions are casein and whey (serum).
   1. Heating above 140 degrees F. (60 degrees C.) causes whey proteins to denature and aggregate.
   2. These proteins settle to the bottom and can cause scorching.

C. Milk proteins are coagulated by various means in food production.
   1. Rennin is an enzyme used in cheese production.
      a. Rennet, a form of rennin, is derived from the fourth stomach of cows.
      b. Added to milk, rennet causes caseins to clot, and whey is then separated off.
   2. Acid conditions cause caseins to coagulate.
      a. Fermented milk products are a result of the addition of active bacteria cultures to milk.
         (1) Acids are produced by bacteria under constant conditions.
         (2) Yogurt is produced when Streptoccus thermophilus and Lactobacillus bulgaricus are added to warm milk.
      b. When the pH of milk is below 4.6, caseins coagulate.
         (1) Milk will become acidic when allowed to sour.
         (2) Addition of foods such as lemon juice will cause acidic conditions and coagulation.

EFFECT OF FOOD PREPARATION METHODS ON PROTEINS (continued)

III. Egg Proteins

- A. Egg proteins are curled in the raw egg.
- B. Food preparation methods such as beating affect denaturation of egg proteins.
  - 1. Beating eggs causes proteins to uncurl and form new bonds.
    - a. Air is trapped between protein molecules.
    - b. Egg whites are most easily denatured by beating at 70 degrees F.(52 degrees C.) , possibly because of decreased surface tension.
    - c. If egg whites are overbeaten, air bubbles become smaller, and stability decreases.
    - d. Fat in egg yolks prevents yolks from being beaten into the same type of foam as egg whites.
  - 2. Acid increases foam stability.
    - a. Cream of tartar has been found to be more effective in increasing foam stability than acetic acid or citric acid.
    - b. Stability enables proteins to coagulate before the foam collapses.

Nutrition Curriculum
Unit #4
Function #VI
Activity #1

NAME OF ACTIVITY: THE EFFECT OF FOOD PREPARATION METHODS ON PROTEIN (Introduction to Proteins)

GENERALIZATIONS: Foods contain different types of proteins, and these proteins have an effect on the properties of the foods during preparation.
Protein structure is affected by heat, acid, mechanical means, bacterial action, moisture, enzymes.

OBJECTIVES: Identify foods containing protein using scientific methods.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
Do all foods contain proteins?
How does protein differ from carbohydrates and fat?
Do the proteins in all foods react in the same way?
Are all proteins in foods the same proteins?

EQUIPMENT:
Biuret Solution
Eye dropper
custard cups

PROCEDURES:
1. Place a variety of foods in custard cups. These might include all-purpose flour, milk, apple, potato, pinto beans or chicken.
2. Add a few drops of Biuret solution.
3. Record the results.

SUMMARY: The students should be able to discern the foods containing proteins using Biuret solutions.

Nutrition Curriculum
Unit #4
Function #VI
Activity #2

NAME OF ACTIVITY THE EFFECT OF HEAT ON MILK PROTEIN

GENERALIZATIONS: Heat causes whey proteins to separate from milk and settle to the bottom of the container.

OBJECTIVES: Perform food experiments to see how protein is affected by heat.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

What happens when milk is heated above 140 degrees F. (60 degrees C.)?
How can the effects of this heating be minimized?

EQUIPMENT:

hot plate or stove burner
measuring cup
thermometer
watch or clock
sauce pan
1 cup milk

PROCEDURES:

1. Measure one cup of milk into a sauce pan.
2. Heat slowly to 180 degrees F. Record the time it takes to reach this temperature.
3. Pour off milk. Observe the precipitate in the bottom of the pan.
4. Record the texture and appearance of the precipitate.

Experimental Variation:

1. Repeat the experiment, heating the milk rapidly to 180 degrees F. Are there any differences in the precipitate formed?

SUMMARY: Whey proteins settle to the bottom of the container as a precipitate when milk is heated above 140 degrees F.(60 degrees C.) Stirring during heating will help minimize these effects and prevent scorching.

Nutrition Curriculum
Unit #4
Function #VI
Activity #3

NAME OF ACTIVITY: COAGULATION OF MILK PROTEINS BY ENZYMES

GENERALIZATIONS: Protein structure is affected by specific enzymes.
Enzymes are denatured by heat.

OBJECTIVES: Perform food experiments to see how protein is affected by heat and enzymes.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

What are commercially used methods of altering milk proteins?
What products can be made using enzymes to alter milk proteins?
What happens when temperatures above or below 104 degrees F. (40 degrees C.) are used when processing milk with rennin?

EQUIPMENT:

hot plate or stove burner
measuring cup
thermometer
measuring spoons
watch or clock
knife
mixing spoon
sauce pan with lid

PROCEDURES:

1. Place 5 ml. of milk in a test tube.
2. Add 3-4 drops of enzyme dispersion prepared from one rennin tablet in 10 ml. distilled water.
3. Place test tube in a 104 degrees F. (40 degrees C.) water bath, using a sauce pan over low heat.
4. Record the length of time required for coagulation to occur.

COAGULATION OF MILK PROTEINS BY ENZYMES (continued)

Experimental Variation:

1. Effect of temperature
   - a. Basic procedure
   - b. Refrigerate milk overnight. Note whether coagulation occurs.
   - c. Heat mixture to 212 degrees F.(100 degrees C.). Note whether coagulation occurs.

(Adapted from Campbell, Penfield, Griswold. The Experimental Study of Food, 2nd edition, p. 103.)

Further Uses of Rennet:

Rennet pudding (junket). See Rombauer and Becker, Joy of Cooking.

Cottage cheese may be made with or without rennet. A comparison of the two methods might be interesting for students. The procedure for making cottage cheese without rennet may also be found in Joy of Cooking. The procedure for using rennet is as follows:

1. Mix 2 cups milk and 1/2 cup buttermilk. Heat to 110 degrees F.
2. Crush 1/2 rennet tablet and dissolve in 2 T. cold water. Add to warm milk.
3. Let stand undisturbed for 2 minutes.
4. Heat slowly over hot water. When warm, cut through curd with knife.
5. When curds and whey have separated, drain in cheese cloth and plunge in ice water.

Record results.

SUMMARY: The properties of milk proteins allow milk to be altered to make a variety of foods, including cheese. Enzymes can be used in this process.

Nutrition Curriculum
Unit #4
Function #VI
Activity #4

NAME OF ACTIVITY: EFFECT OF ACID-CONTAINING FOODS ON MILK

GENERALIZATIONS: Acid added to milk causes casein to coagulate.

OBJECTIVES: Perform food experiments to see how protein is affected by varying temperatures and acids.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

Which foods tested had the lowest pH?
What were the results when the acid foods were added to milk?
What effect did changing the temperature of the components have?

EQUIPMENT:

measuring cups
litmus paper
spoon
stove burner or hot plate
saucepan with lid
clock or watch

PROCEDURES:

1. Test the following ingredients with litmus paper, and record results:
   a. Tomato juice
   b. Lemon juice
   c. Fresh milk
   d. Milk that has been allowed to sour naturally
   e. Cream of tartar
   f. Brown sugar

2. Mix the following ingredients. Test with litmus paper, and record pH. Compare mixtures for degree of curdling immediately and after 15 minutes.
   a. 1/2 cup hot tomato juice + 1/2 cup hot milk
   b. 1/2 cup cold tomato juice + 1/2 cup cold milk
   c. 1/2 cup cold tomato juice mixed with 1/8 teaspoon baking soda + 1/2 cup hot milk

EFFECT OF ACID-CONTAINING FOODS ON MILK (continued)

  d. 1 tablespoon lemon juice + 1 cup cold milk
  e. 1 tablespoon lemon juice + 1 cup hot milk

3. Follow-up questions:
   Which procedure had the most pronounced effect on curd formation? Why?
   Which procedure had the least effect on curd formation? Why?

SUMMARY: Acid and heat promote coagulation of milk caseins, and curds will be formed. Further experimentation with other additives, such as brown sugar and cream of tarter can be included.

Nutrition Curriculum
Unit #4
Function #VI
Activity #5

NAME OF ACTIVITY: EFFECT OF ACID-PRODUCING BACTERIA ON MILK CASEINS

GENERALIZATIONS:
When milk is acidified, caseins will coagulate.
Some bacteria, when introduced to milk, produce acid which cause caseins to coagulate.
Bacteria are affected by heat.

OBJECTIVES: Perform food experiments to see how protein is affected by acids and heat.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
Are all bacteria bad?
What effect do certain bacteria have on milk proteins?
What products are made in this fashion?
Why would a person on antibiotics eat yogurt with active cultures?
What effect will varying temperatures have on yogurt production?
Why?

EQUIPMENT:
hot plate or stove burner
measuring cup
thermometer
measuring spoons
watch or clock
wide-mouth quart vacuum bottle
sauce pan with lid
mixing spoon

PROCEDURES: Scald 3 3/4 cup fluid milk. Discard scum. Let cool to 115 degrees F. (46 degrees C.) Add a few spoonfuls of scalded milk to 1/4 cup fresh yogurt that has been warmed to 115 degrees F. (46 degrees C.) and stir until smooth. Mix the yogurt starter into the rest

EFFECT OF ACID-PRODUCING BACTERIA ON MILK CASEINS (continued)

of the milk. Place in a prewarmed, wide-mouth vacuum bottle. Place lid on, and let sit for about four hours or until set. When set, remove lid, cover loosely, and refrigerate.

Experimental Variations:
1. Repeat experiment. Use unscalded milk.
2. Vary the heat applied.

SUMMARY: Acid-producing bacteria lower the pH of milk and cause caseins to coagulate. Heat affects bacteria. If the heat is too high, bacteria will be killed, and acid will not be produced.

Nutrition Curriculum
Unit # 4
Function #VI
Activity #6

NAME OF ACTIVITY: EFFECTS OF ACIDS AND ENZYMES ON GELATIN

GENERALIZATIONS:

Gelatin is a form of protein.
When hydrated, gelatin is affected by heat, acid, and enzymes.

OBJECTIVES: Perform food experiments to see the effects of enzyme-containing fruit on gelatin formation.

BACKGROUND INFORMATION: Gelatin is made from connective tissue. It is a low biological value protein because it lacks certain essential amino acids, particularly tryptophan. When hydrated with water, gelatin swells, and gelation occurs. Coagulation does not occur. The process is reversible because the hydrogen bonds formed during hydration can be broken. Addition of juices introduce acid, which will cause a weaker gel. Fruits containing enzymes, such as fresh pineapple (bromelin) or papaya, (papain) hydrolyze the proteins and prevent gelation. When the enzymes are destroyed by heat, the same fruits can be added with no adverse affects on the gelling properties. The enzymes found in papaya and pineapple are used as meat tenderizers.

DISCUSSION QUESTIONS:

What differences were observed between the gelatin containing fresh fruit and that containing canned fruit?
What is the reason for the observed difference?
What commercial uses do bromelin and papain have?

EQUIPMENT:

2 small mixing bowls
mixing spoons
1 pkg. gelatin
1/2 cup fresh pineapple or papaya
1/2 cup canned pineapple or papaya

EFFECTS OF ACIDS AND ENZYMES ON GELATIN
(continued)

PROCEDURES:

1. Prepare a package of gelatin according to directions. Divide mixture in half.
2. To one half of the mixture, add 1/2 cup fresh pineapple or papaya. Label and refrigerate.
3. To the other half of the mixture, add 1/2 cup canned pineapple or papaya. Label and refrigerate.
4. The following day, compare the two samples for degree of gelation and record results.

SUMMARY:

The effects of enzymes on proteins can be easily shown when fruits containing enzymes are added to gelatin. These same enzymes are used as meat tenderizers, and the effects are the same.

Nutrition Curriculum
Unit #4
Function #VI
Activity #7

NAME OF ACTIVITY: EFFECT OF BEATING (MECHANICAL ACTION) ON EGG PROTEINS

GENERALIZATIONS: Egg proteins are denatured by mechanical action. Proteins in egg whites and egg yolks react differently when beaten.

OBJECTIVES: Perform food experiments to show how egg proteins are denatured by mechanical means.

DISCUSSION QUESTIONS:

How does temperature affect foaming properties of eggs?
How do the foams of egg whites and egg yolks differ?
What effects does prolonged beating have on egg whites?
What effect does adding egg yolk to egg white have on the foaming properties of egg white? Why?

EQUIPMENT:

Small mixing bowls
hand beater
eggs
cream of tartar

PROCEDURES:

1. Use eggs that are at room temperature. Separate eggs, taking care not to break the yolks.
2. Beat one egg white until soft peaks form.
3. Beat one egg white until stiff and dry.
4. Beat one egg yolk until lemon-colored.
5. To one egg white, add 1/2 teaspoon egg yolk and beat.

EFFECT OF BEATING (MECHANICAL ACTION) ON EGG PROTEINS (continued)

6. To one egg white, add 1/4 teaspoon of cream of tartar.
7. Record results on a chart.
8. After 30 minutes, record observations again.

Experimental Variation:

1. Repeat experiment with cold eggs that have not been allowed to come to room temperature.
2. Record results.

SUMMARY: Mechanical action will denature egg proteins. The degree of stability of the resulting foam is affected by heat, amount of beating, and such added ingredients as cream of tartar.

Nutrition Curriculum
Unit #4
Function #VI
Activity #8

NAME OF ACTIVITY: HOW EGG PROTEINS ARE AFFECTED BY MECHANICAL MEANS, SUGAR, SALT, AND HEAT

GENERALIZATIONS:

The structure of egg proteins is affected by mechanical means.

Addition of sugar or salt affects egg protein structure.

Heat denatures and coagulates egg proteins.

OBJECTIVES: Perform food experiments to see the effects of certain food preparation methods on the structure of egg proteins.

BACKGROUND INFORMATION:

Both the white and the yolk contain protein. Ovalbumin, contained in the egg white, is an important structural component of baked goods. Globulins are important for foaming properties. The proteins of the yolk have not been studied as extensively as those found in the white. Lysozyme, an enzyme, is thought to be responsible for the thinning of egg white as the egg ages.

When eggs are hard-cooked, the formation of ferrous sulfide may cause a green ring around the yolk. Both excessive heat and elevated pH in the yolk favor the formation of this ring.

The pH of the egg white is important to foam formation. Cream of tartar lowers the pH and increases foam stability to heat.

Lemon juice also stabilizes the foam.

Sugar retards denaturation of egg white proteins. Salt added before beating reduces the stability of the foam and decreased volume.

DISCUSSION QUESTIONS:

How does the appearance of an egg white change when it is beaten?

How does the addition of sugar or salt affect the structure of beaten egg whites?

Why is cream of tartar added to egg whites when beating them?

HOW EGG PROTEINS ARE AFFECTED BY MECHANICAL MEANS, SUGAR, SALT, AND HEAT (continued)

EQUIPMENT:

mixing bowls
hot plate or stove top
measuring cup
measuring spoons
hand egg beater
eggs
sugar

PROCEDURES:

1. Beat egg white until stiff. Record beating time.
2. Add 1 teaspoon sugar to egg white before beating, beat until stiff. Record beating time.
3. Beat egg white until soft peaks form, add 1 teaspoon sugar, beat until stiff. Record beating time.
4. Add 1/4 teaspoon egg yolk to egg white and beat. Record beating time.
5. Compare times. Wait 30 minutes. Compare foams. Which are more stable?

Experimental Variation:
1. Compare treatment methods

SUMMARY:

Egg proteins are affected by heat, sugar, acid, and salt. Food preparation methods should take advantage of the positive effects.

RESOURCES

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Nutrition Curriculum
Unit 5

Avoid Too Much Fat, Saturated Fat and Cholesterol

Nutrition Curriculum Unit Five

<Dietary Guidelines for Americans ** Avoid Too Much Fat, Saturated Fat and Cholesterol>

VII. Function: Demonstrate knowledge of the sources of fat in the diet and its functions in the body.

GENERALIZATIONS:

1. The caloric energy value of food is measured in heat units, called kilocalories.

2. Fat has the highest calorie value per gram when compared to proteins and carbohydrates.

3. Fats can be categorized as saturated, monounsaturated, and polyunsaturated.

4. Excessive amounts of a nutrient are not beneficial and may be harmful.

OBJECTIVES:

The student will:

A. Define and classify types of fat and cholesterol.

B. List the major functions of fat in the body.

C. Identify the functions of cholesterol in the body.

D. Identify selected foods which are sources of saturated, monounsaturated, and polyunsaturated fats.

E. Identify selected foods which are dietary sources of cholesterol

F. Discuss the possible relationship between cholesterol level and disease.

G. Modify recipes to lower saturated fat and/or cholesterol content.

ADDITIONAL LEARNING ACTIVITIES:

1. Pretest: Nutrition Education Today, pp.290-291.

2. Discuss animal and plant sources of fat and their relationship to the U.S. Dietary Guidelines.

3. Discuss what vitamins must be considered if fat in the diet is reduced.

4. Nutrition Education Today, p. 289, Clues to Fat Content.

5. Make butter by shaking cream in a covered far. Show how the fat molecules coalesce or clump together.

6. Plan experiments to test the effects of temperature (cold or warm oil, or cold or warm egg yolks) on emulsions.

7. Do an experiment to discover the smoke points and solidifying points of various plant and animal fats.
Fry foods at recommended temperature, then 50 degrees higher and lower than the recommended temperature. Compare the amount of oil used and the doneness of the food.

8. Demonstrate the off-flavors in fat caused by oxidative rancidity by comparing potato chips stored in clear jars versus aluminum foil covered jars, p. 21-22, Experiments in Food Science.

ADDITIONAL RESOURCES:

Nutrition Education Today, Unit: Fats in the Diet, pp. 287-297; p. 230.

McWilliams, M. & Heller, H. (1984). The world of nutrition. Lexington: Ginn & Co. Topic 4: Focus on Fats. pp. 42-51.

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Nutrition Curriculum
Unit #5
Function #VII
UNIT OUTLINE

AVOID TOO MUCH FAT, SATURATED FAT AND CHOLESTEROL

I. Fat in the Diet and Its Function in the Body

A. Fat is important as a concentrated source of energy 9 kcals/g)
1. Certain amount of body fat is necessary:
a. To reserve a supply of energy.
b. To maintain constant body temperature.
c. To cushion vital organs to protect from injury.
d. To carry fat-soluble vitamins A, D, E, K.
e. As a source of essential fatty acids.
f. And helpful in providing a satisfied feeling for up to four hours after eating.

B. Fatty Acids
1. Saturated fats - Generally solid at room temperature; usually derived from animal sources.
a. Foods with saturated fats are:
(1) Whole milk and products from whole milk
(2) Egg yolks
(3) Meat and meat fats (bacon and lard)
(4) Coconut oil and palm oil
(5) Chocolate
(6) Regular margarine
(7) Hydrogenated vegetable shortenings
b. Diets rich in saturated fats can lead to elevated blood cholesterol levels.
2. Unsaturated fats - Generally liquid at room temperature; derived from plant sources.
a. Monounsaturated
(1) Olive oil
(2) Most nuts
b. Polyunsaturated
(1) Safflower oil
(2) Sunflower oil
(3) Corn oil
(4) Cottonseed oil
(5) Soybean oil
(6) Sesame oil
(7) Fish such as mackerel, salmon, herring
c. Both monounsaturated and polyunsaturated fats appear to lower blood cholesterol levels.

C. Cholesterol
1. A fat-like compound occurring in bile, blood, brain, nerve tissues, liver and other parts of the body.

AVOID TOO MUCH FAT, SATURATED FAT AND CHOLESTEROL (continued)

- a. Needed to produce body cells, vitamin D, hormones.
- b. Obtained from animal foods or synthesized in the body (not found in plant sources).
- c. High blood cholesterol levels appear to promote atherosclerosis (heart disease).
- d. Foods high in cholesterol are:
  1. Egg yolk
  2. Liver and other organ meats
  3. Red meats, poultry, fish
  4. Dairy products
- e. Average cholesterol intake in the U.S. is 400-500 mg/day for boys and men.

2. High blood cholesterol levels can be reduced by:
   - a. Selecting low fat meats, poultry, fish, dry peas and beans.
   - b. Limiting intake of fats on and in foods.
   - c. Using food labels to choose foods low in saturated fat.
   - d. Using eggs and organ meats in moderation.
   - e. Limiting saturated fats.
   - f. Reducing cholesterol intake to 250-300 mg/day.
   - g. Using lower-fat milk products.
3. Modification of recipes
   - a. Lower saturated fats.
   - b. Decrease high cholesterol foods.
   - c. Replace with unsaturated fats.

II. The function of fat in food preparation

- A. Food Palatability
- B. Browning
- C. Tenderization
- D. Aeration
- E. Emulsification
- F. Heat Transfer
- G. Textural Effects

AVOID TOO MUCH FAT, SATURATED FAT AND CHOLESTEROL (continued)

Some common dietary fats are:

Butter which is made from the fat of cream. Butter is solid at room temperature and is saturated.

Margarine is made from different kinds of vegetable oils. It has been partially hardened by hydrogenation. The consistency is a good indicator of the saturation. (Soft margarine will be less saturated than stick margarine.)

Lard is the fat of hogs. It is saturated.

Vegetable oils are identified by the name of the vegetable from which they are made. Vegetable oils may also be called salad oils. Vegetables are mostly high in polyunsaturated fatty acids.

Vegetable shortenings are made from vegetable oils. They are made solid by hydrogenation. Hydrogenation increases the amount of saturated fats.

Adapted from Hamilton, E., Whitney, E. & Sizer, F. (1988). Nutrition: Concepts and Controversies.

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NAME OF ACTIVITY: FAVORITE FOOD FATS INVENTORY

GENERALIZATION: Fats can be categorized as saturated, monounsaturated, and polyunsaturated.

OBJECTIVES: Identify selected foods which are sources of saturated, monounsaturated, and polyunsaturated fats.

BACKGROUND INFORMATION: Knowledge of how to read labels and graphs. Knowledge of types of fat and cholesterol and the functions of fat in the body.

DISCUSSION QUESTIONS:

How often do you eat high fat foods?
Why do foods differ in the amount of fat they contain?
How could you reduce the amount of high fat foods you consume?
Why is it necessary to have some fat in your diet?
Evaluate reading labels and how this process lessens fat consumption.

EQUIPMENT:

Two favorite food labels
Poster board and colored pencils
Hand out "Reading labels"
Chart fat contents of foods
Self test - How do you score on fat

PROCEDURES:

1. Evaluate your favorite foods by calculating total grams of fat, saturated fatty acids, and cholesterol by reading the labels and using the primer on fat chart.
2. Prepare a graph for each food showing calculations by using color coding graphing for each amount of grams of fat, fatty acids, and cholesterol.

SUMMARY: Foods differ in the amount of fat they contain; students will be able to visualize the amount of fat in their favorite foods and evaluate how often they consume high fat foods.

FAVORITE FOOD FATS INVENTORY (continued)

WHAT'S ON A LABEL?

Nutrition and ingredient information on food labels can help you choose foods with less fat and cholesterol.

Nutrition Labeling
Many manufacturers include nutrition information on food labels. These labels show the amount of fat (in grams) in a serving. The product's percentage of calories from fat and the amount of polyunsaturated fatty acids (polyunsaturates), saturated fatty acids (saturates), and cholesterol may also be listed. Amounts of monounsaturated fatty acids are seldom listed on labels. With this information, you can compare the fat and cholesterol content of different products. For example, the following labels on two products from the same manufacturer show that compared to mayonnaise, an imitation (reduced calorie) mayonnaise may contain only half as much fat.

Mayonnaise
Nutrition Information Per Serving

Serving size	1 tablespoon (14 g)
Servings per package	32
Calories	100
Protein	<1
Carbohydrate	<1
Fat provides 99% of calories	11 g
Polyunsaturates	6 g
Saturates	2 g
Cholesterol (50 mg/100 g)	5 mg
Sodium	70 mg

Imitation (Reduced-Calorie) Mayonnaise
Nutrition Information Per Serving

Serving size	1 tablespoon (14 g)
Servings per package	32
Calories	45
Protein	0
Carbohydrate	1 g
Fat provides 93% of calories	5 g
Polyunsaturates	3 g
Saturates	1 g
Cholesterol (40 mg/100 g)	5 mg
Sodium	90 mg

WHAT'S ON A LABEL? (continued)

Ingredient Labeling

The labels of most packaged and processed foods include a list of ingredients. Ingredients are listed by weight, with the item present in the greatest amount listed first and the item with the least amount listed last. Although amount of ingredients are not given, the order, number, and types of fats listed can be helpful. As shown below, both mayonnaise and imitation (reduced-calorie) mayonnaise contain unsaturated fatty acids as soybean oil. The imitation mayonnaise has more water (first item listed on the label) than the regular mayonnaise and has added carbohydrate (food starch).
To obtain more information, write to the manufacturer.

Mayonnaise

INGREDIENTS: Soybean oil, eggs, water, vinegar, egg yolks, salt, sugar, lemon juice, paprika, dehydrated garlic, dehydrated onion, calcium disodium EDTA to protect flavor, natural flavor.

Imitation (Reduced-Calorie) Mayonnaise

INGREDIENTS: Water, soybean oil, food starch - modified, egg yolks, vinegar, salt, eggs, mustard, flour, phosphoric acid, dl - tocopheryl acetate (Vitamin E), calcium disodium EDTA to protect flavor, natural and artificial flavor, oleoresin, paprika, beta carotene (color).

Ingredients high in saturated fatty acids	Ingredients high in unsaturated fatty acids
Beef fat	Oils, liquid or partially hydrogenated:
Butter	corn
Cream	cottonseed
Lard	safflower
Cocoa butter	sesame
Coconut oil	soybean
Palm oil	sunflower

Remember the following:

* To avoid too much total fat, go easy on products listing a fat or oil first, or listing many fat and oil ingredients on their label.
* Use the box above to help you identify ingredients providing different kinds of fats.

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Table 3: Fat and Cholesterol Comparison Chart

Example of	Item	Saturated Fatty Acids (grams)	Total Fat (grams)	Cholesterol (milligrams)
Beef 100 grams (3.5 oz)	Ground Beef, broiled medium	7.3	18.5	87
Processed Meats 100 grams (3.5 oz)	Sausage smoked, link, beef, and pork	10.6	30.3	71
	Bologna, beef	11.7	28.4	56
	Frankfurter, beef	12	29.4	48
	Salami, dry or hard, pork, beef	12.2	34.4	79
Pork	Ham steak, extra lean	1.4	4.2	45
	Pork, center loin lean only, braised	4.7	13.7	111
	Pork, spare ribs, lean and fat, braised	11.8	30.3	121
Poultry	Chicken broilers or fryers, roasted:			
	* light meat w/o skin	1.3	4.5	85
	* light meat w/ skin	3.1	10.9	84
	* dark meat w/o skin	2.7	9.7	93
	* dark meat w/ skin	4.4	15.8	91
	* chicken skin	11.4	40.7	83
Fin Fish 100 grams (3.5 oz)	Cod, Atlantic, dry heat cooked	0.1	0.7	58
	Perch, mixed species, dry heat cooked	0.2	1.2	115
	Snapper, mixed species, dry heat cooked	0.4	1.7	47
	Tuna, bluefin, dry heat cooked	1.6	6.3	49
	Mackerel, Atlantic, dry heat cooked	4.2	17.8	75

Table 3: Fat and Cholesterol Comparison Chart continued

Example of	Item	Saturated Fatty Acids (grams)	Total Fat (grams)	Cholesterol (milligrams)
Crustaceans 100 grams (3.5 oz)	Crab, blue, moist heat cooked	0.2	1.8	100
	Shrimp, mixed species, moist heat cooked	0.3	1.1	195
Liver and Organ Meats 100 grams (3.5 oz)	Beef liver, braised	1.9	4.9	389
Eggs (1 yolk = 17 grams)	Egg yolk, chicken, raw	1.7	5.6	272
(1 white = 33 grams)	Egg white, chicken, raw	0	trace	0
(1 whole = 50 grams)	Egg, whole, chicken, raw	1.7	5.6	272
Nuts and 100 grams (3.5 oz) Poultry	Chestnuts, European, roasted	0.4	2.2	0
	Almonds, dry roasted	4.9	51.6	0
	Sunflower seed kernels, dry roasted	5.2	49.8	0
	Pecans, dry roasted	5.2	64.6	0
	Walnuts, English, dried	5.6	61.9	0
	Pistachio nuts, dried	6.1	48.4	0
	Peanut kernels, dried	6.8	49.2	0
	Cashew nuts, dry roasted	9.2	46.4	0
Fruits	Peaches, raw	0.010	0.09	0
	Oranges, raw	0.015	0.12	0
	Strawberries, raw	0.020	0.37	0
	Apples, w/ skin, raw	0.058	0.36	0
Grains and Legumes 100 grams (3.5 oz)	Split peas, cooked, boiled	0.054	0.39	0
	Red kidney beans, cooked, boiled	0.07	0.5	0
	Oatmeal, cooked	0.19	1.0	0

Table 3: Fat and Cholesterol Comparison Chart continued

Example of	Item	Saturated Fatty Acids (grams)	Total Fat (grams)	Cholesterol (milligrams)
Vegetables 100 grams (3.5 oz)	Cooked, boiled, drained:			
	* potato w/o skin	0.026	0.10	0
	* carrots	0.034	0.18	0
	* spinach	0.042	0.26	0
	* broccoli	0.043	0.28	0
	* beans, green and yellow	0.064	0.28	0
	* squash, yellow, crookneck	0.064	0.31	0
	* corn	0.197	1.28	0
	Avocado, raw, w/o skin or seed:			
	* California origin	2.60	17.34	0
Milk and Cream 1 cup (8 fl oz.)	Skim milk	0.3	0.4	4
	Low fat milk (1% fat)	1.6	2.6	10
	Whole milk (3.7% fat)	5.6	8.9	35
	Light cream	28.8	46.3	159
Yogurt and Sour cream 1 cup (8 fl oz.)	Plain yogurt, low fat (1.6%)	2.3	3.5	14
	Sour Cream	30.0	48.2	102
Soft cheeses 1 cup (8 fl oz.)	Cottage cheese, low fat (1%)	1.5	2.3	10
	Cottage cheese, creamed	6.0	9.5	31
	Ricotta, part skim	12.1	19.5	76
	Cream cheese	49.9	79.2	250
Hard cheeses (8 ounces)	Mozzarella, part skim	22.9	36.1	132
	Provolone	38.8	60.4	157
	Swiss	40.4	62.4	209
	American processed	44.7	71.1	213
	Cheddar	47.9	75.1	238

Table 3: Fat and Cholesterol Comparison Chart continued

Example of	Item	Saturated Fatty Acids (grams)	Total Fat (grams)	Cholesterol (milligrams)
Vegetable Oil and Shortening 1 cup (8 fl oz.)	Safflower oil	19.8	218.0	0
	Sunflower oil	22.5	218.0	0
	Corn oil	27.7	218.0	0
	Olive oil	29.2	216.0	0
	Soybean oil	31.4	218.0	0
	Margarine, regular soft tub	32.2	182.6	0
	Margarine, stick or brick	34.2	182.6	0
	Peanut oil	36.4	216.0	0
	Household vegetable shortening	51.2	205.0	0
	Cottonseed oil	56.4	218.0	0
	Palm oil	107.4	218.0	0
	Coconut oil	188.5	218.0	0
	Palm kernel oil	177.4	218.0	0
Animal Fats 1 cup (8 fl oz.)	Chicken fat	61.2	205.0	174
	Lard	80.4	205.0	195
	Mutton fat	96.9	205.0	209
	Beef fat	102.1	205.0	223
	Butter	114.1	183.9	496

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NAME OF ACTIVITY: RECIPE MAKEOVERS

GENERALIZATION: Fat has the highest calorie value per gram when compared to proteins and carbohydrates.

OBJECTIVES: Modify recipes to lower saturated fat and/or cholesterol content.

BACKGROUND INFORMATION: Knowledge of food preparation methods and fat contents of foods used in recipes.

DISCUSSION QUESTIONS:

How do food preparation methods affect fat content of foods?
Why are processed foods higher in fat?
Why are fast foods high in fat?
List methods of food preparation that can decrease fat content in recipes.

EQUIPMENT:

Basic Recipes
Fat count food charts
Handout "15 Tips to Help Avoid Fat"

PROCEDURES:

1. Modify recipes selected by teachers or students using simple adjustments to moderate fat and cholesterol levels.
2. Calculate grams of total fat, grams of saturated fatty acids, and milligrams of cholesterol before and after recipes.
3. * Prepare and taste the makeover recipes. (optional)
4. Compile a recipe book from makeovers.

SUMMARY:

Students analyze the methods of preparation of foods and how the methods influence the fat content of foods.
Students are able to evaluate the substitution process of modifying high fat diets.

CLASS HANDOUT

Health Checks For Your Recipes and Menus:

1. Are all the ingredients essential? For example, is the heavy coating of flaked coconut (high in saturated fat) on top of the fluffy frosting necessary to the cake's flavor?

2. Do any of the ingredients come in lower-calorie versions? Use white meat chicken or turkey instead of dark. Substitute plain low-fat yogurt or cottage cheese for half the mayonnaise or sour cream in a salad dressing or dip.

3. Will the recipe work if certain ingredients are reduced? Prepare pies with a single crust to reduce fat and save more than 100 calories per serving.

4. Can this dish be cooked another way? Oven-bake rather than fry. Roast meat and poultry on rack so fat can drain off (remove the skin after cooking). Cook rice in herb flavor broth rather than frying it or adding butter.

5. Is the topping changeable? Many times a topping can be eliminated, changed, or modified. For example, that heavily buttered, cheesy crouton on French onion soup can be replaced with a light sprinkling of Parmesan. On baked potatoes, try plain low-fat yogurt (7 calories per tablespoon) mixed with minced green onions instead of sour cream (31 calories per tablespoon) or butter (102 calories per tablespoon). Season fish, vegetables, poultry and meats with lemon juice and fresh or dried herbs instead of butter or margarine.

6. Can this menu be rescued from Fat City? Explore new ways to plan meals. Cut meat portions and increase vegetables in a meal. Use more plain vegetables instead of those with cream, butter, or cheese sauces. Prepare meals using basic ingredients to control what goes into a dish and avoid hidden calories often found in prepared foods.

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CLEAN THE FAT OUT OF YOUR RECIPES!

HIGH FAT INGREDIENT	LOWER FAT SUBSTITUTION
Whole milk or cream	Skim milk in gravy or cream soup, thickened with corn starch
Sour Cream	Nonfat yogurt or lowfat cottage blended with lemon juice
Ricotta cheese	Use low fat or dry cottage cheese in lasagna/canneloni.
Natural cheese	Special low fat cheese (2-3 grams of fat per ounce) for blending into casseroles or melted over food
	Mix 1/2 lower fat cheese and 1/2 firm tofu for casseroles containing lots of cheese or for cheese enchiladas.
Mayonnaise	1/2 diet mayonnaise mixed with 1/2 nonfat yogurt. Substitute mustard on sandwiches.
Egg	Use 2 egg whites.
Oil	Use 1/2 amount stated in recipe.
Buttered flavored vegetables	Use Herbs with lemon or lime juice as seasoning for vegetables.
Oil-based marinades	Herb-flavored vinegar, white or red wine, lemon juice, well-seasoned broth, or low salt soy sauce.
Salad Dressings	Low calorie salad dressing, mix vinegar/lemon with 2% cottage cheese and chives or sprinkled Parmesan cheese.
Browning food	Use nonstick teflon skillet and vegetable cooking spray or broil.
Gravy, soups	Refrigerate meat drippings and remove solid fat before making gravy or soups.
Meat, poultry	Remove skin from poultry before cooking Choose leaner cuts of meat and tenderize.
Pastry pie shell	Meringue shell

FAT CALORIES IN RELATION TO TOTAL CALORIES

More than 90% fat	Bacon, mayonnaise, butter, margarine, salad and cooking oils, lard, cream, baking chocolate, vegetable shortening, olives
80 - 90%	Sausages, most salad dressings, corned beef, cream cheese, unsweetened coconut, walnuts, pecans, sesame seeds, avocados
65 - 80%	Potato chips, dry-roasted peanuts, ham, frankfurters, American cheese, sunflower seeds, cashews, peanut butter
50 - 65%	Broiled beef, loin steak, roasted leg of lamb
35 - 50%	Most cookies, crackers, cakes, donuts, round steak, lean ground beef, whole milk
20 - 35%	2 percent milk, low-fat yogurt
10 - 20%	Roasted chicken (without skin), broiled fish
Negligible amount	Skim milk, dry cereal, dry cottage cheese, beans, baked or broiled potatoes, most breads, rice, pasta, fruits, vegetables (except avocados and olives).

Source: Basic Nutrition Facts. 1980. Michigan Department of Public Health: Lansing, Michigan.

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Activity #3

NAME OF ACTIVITY: FAT CONTENT OF FAST FOODS

GENERALIZATION: Fat has the highest calorie value per gram when compared to proteins and carbohydrates.

OBJECTIVES: Identify selected foods which are sources saturated, monounsaturated, and polyunsaturated fats.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
Why do we need fat?
What are the hazards of high fat diets?
How could you decrease dietary fat intake?

EQUIPMENT:
Nutrient Content Chart
Graph paper
Magic markers

PROCEDURES:

1. Pass out Fast Food Nutrient Content Chart.
2. List the ten favorite foods you usually select at fast food restaurants.
3. Find the nutrient content of each food you listed:
   a. amount of calories
   b. protein
   c. fat
4. Calculate the nutrient density of each food.
   a. nutrient density = $\frac{\text{amount of nutrient}}{\text{calories}}$
5. Graph nutrient density for each food.
6. Follow-up questions:
   Compare graphs of various favorite foods.
   Which foods were higher in fat content?
   What are the major factors involved in your food selections?
   List foods which are sources of hidden fats?
   Did the food preparation method used affect nutrient density?

FAT CONTENT OF FAST FOODS (continued)

SUMMARY: Foods containing high fat levels are less nutrient-dense than those with lower fat levels. Food preparation methods often lower a food's nutrient density. Many foods consumed at fast food restaurants have a high fat content.

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FAT CONTENT OF FAST FOODS

Food Composition

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
KENTUCKY FRIED CHICKEN				
Original Recipe				
Center breast	1 each	236	24	14
Side breast	1 each	199	16	12
Drumstick	1 each	117	12	7
Thigh	1 each	257	18	18
Wing	1 each	136	10	9
Dinners				
2 piece dinner, white	1 each	322	30	32
2 piece dinner, dark	1 each	346	35	35
2 piece dinner, combo	1 each	341	33	38
Extra Crispy Recipe				
Center breast	1 each	297	24	16
Side breast	1 each	286	17	18
Drumstick	1 each	155	13	9
Thigh	1 each	343	20	23
Wing	1 each	201	11	14
Dinners				
2 piece dinner, white	1 each	755	33	43
2 piece dinner, dark	1 each	765	38	54
2 piece dinner, combo	1 each	902	36	48
Mashed potatoes	1/3 cup	60	2	1
Chicken gravy	1/3 cup	59	2	4
Dinner roll	1 each	61	2	1
Corn on the cob	1 each	176	5	3
Coleslaw	1/3 cup	103	1	6
Kentucky nuggets	1 each	46	3	3
Kentucky nugget sauces				
Barbecue	2 tbsp	35	7	1
Sweet & sour	2 tbsp	58	13	1
Honey sauce	1 tbsp	49	12	<1
Mustard sauce	2 tbsp	36	6	1
Kentucky fries	1 srvg	268	33	13
Mashed Potatoes & gravy	1/3 cup	62	10	1
Buttermilk biscuit	1 each	269	5	14
Potato salad	1/3 cup	141	2	9
Baked beans	1/3 cup	105	5	1
Chicken Little sandwich	1 each	177	6	9

Source: Kentucky Fried Chicken Corporation

FAT CONTENT OF FAST FOODS (continued)

Food Composition

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
LONG JOHN SILVER'S				
Fish, batter fried				
Fish & fryers, 3 piece	1 each	853	43	48
Fish & fryers, 2 piece	1 each	651	30	36
Fish dinner, 3 piece	1 each	1180	47	70
Fish, breaded & fried				
Fish dinner, 3 piece	1 each	940	35	52
Fish dinner, 2 piece	1 each	818	26	46
Chicken				
Chicken plank dinner, 3 piece	1 each	855	32	51
Chicken plank dinner, 4 piece	1 each	1037	41	59
Chicken nugget dinner, 6 piece	1 each	699	23	45
Clam chowder	1 srvg	128	7	5
Clam dinner	1 each	955	22	58
Fish & chicken dinner	1 each	935	36	55
Oyster dinner	1 each	789	17	45
Scallop dinner	1 each	747	17	45
Seafood platter	1 each	976	29	58
Batter fried shrimp dinner	1 each	711	17	45
Fish sandwich platter	1 each	835	30	42
Salads				
Ocean Chef	1 each	229	27	8
Seafood	1 each	426	19	30
Cole slaw	1 srvg	182	1	15
Fries	1 srvg	247	4	12
Hush puppies	1 each	145	3	7

Source: Long John Silver's Inc., Lexington, KY

McDONALD'S				
	Sandwiches			
Big Mac	1 each	570	25	35
Quarter Pounder	1 each	427	25	24
Quarter Pounder w/ cheese	1 each	525	30	32
Filet-O-Fish	1 each	435	15	26
Hamburger	1 each	263	12	11
Cheeseburger	1 each	318	15	16
French fries	1 srvg	220	3	12

FAT CONTENT OF FAST FOODS (continued)

Food Composition

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
McDONALD'S continued				
Chicken McNuggets	6 each	323	19	20
Milkshakes				
Chocolate	10 fl oz	383	10	9
Strawberry	10 fl oz	362	9	9
Vanilla	10 fl oz	352	10	8
Sundaes				
Hot fudge	1 each	357	7	11
Strawberry	1 each	320	6	9
Caramel	1 each	361	7	10
Soft ice cream cone	1 each	189	4	5
Pies				
Fried apple	1 each	253	2	14
Fried cherry	1 each	260	2	14
Cookies, package				
McDonaldland cookies	1 pkg	308	4	10
Chocolate chip cookies	1 pkg	342	4	16
Breakfast items				
English muffin, w/ butter	1 each	186	5	5
Egg McMuffin	1 each	340	19	16
Hot Cakes w/ butter & syrup	1 each	500	8	10
Scrambled eggs	1 each	180	13	13
Sausage	1 srvg	210	10	19
Hash brown potato patty	1 each	144	1	9
Sausage McMuffin	1 each	427	18	26
Sausage McMuffin w/ egg	1 each	517	23	33
Biscuit, plain	1 each	330	5	18
Biscuit w/ sausage	1 each	467	12	31
Biscuit w/ sausage & egg	1 each	585	20	40
Biscuit w/ bacon, egg, & cheese	1 each	483	17	32
Salads				
Chef salad	1 each	226	21	13
Shrimp salad	1 each	99	14	3
Garden salad	1 each	91	6	6
Chicken salad oriental	1 each	146	23	4

Source: McDonald's Corporation, Oak Brook, Illinois. Some values for Salads estimated from known values for major ingredients.

FAT CONTENT OF FAST FOODS (continued)

Food Composition

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
TACO BELL				
Burritos:				
Bean	1 each	360	13	11
Beef	1 each	402	22	17
Bean & beef	1 each	381	17	14
Burrito supreme	1 each	422	17	19
Double beef supreme	1 each	465	23	23
Enchirito	1 each	382	20	20
Fajita (steak taco)	1 each	235	15	11
Tacos:				
Regular	1 each	184	10	11
Taco Bellgrande	1 each	351	18	22
Taco light	1 each	411	19	29
Soft taco	1 each	228	12	12
Tostadas				
Regular	1 each	243	10	11
Beefy tostada	1 each	322	15	20
Bellbeefer	1 each	312	17	13
Mexican pizza	1 each	714	28	48
Taco salad with salsa	1 each	949	36	62
Nachos:				
Regular	1 each	356	7	19
Bellgrande	1 each	719	23	49
Pintos & cheese	1 each	194	9	10
Taco sauce	1 each	2	<1	<1
Salsa	1 each	18	4	<1
Cinnamon Crispas	1 each	266	27	16

Source: Taco Bell Corporation, California for most nutrient values.

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
WENDY'S				
Hamburgers:				
Single, white bun, no toppings	1 each	350	21	18
Single, multigrain bun, no toppings	1 each	527	30	33
Double, white bun, no toppings	1 each	560	41	34
Big Classic	1 each	470	26	25

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FAT CONTENT OF FAST FOODS (continued)

Food Composition

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
WENDY'S continued				
Cheeseburgers				
Bacon cheeseburger	1 each	460	29	28
Single, w/all toppings	1 each	548	30	33
Double, w/all toppings	1 each	735	48	48
Baked Potatoes				
Plain	1 each	249	6	<1
W/bacon & cheese	1 each	610	16	31
W/broccoli & cheese	1 each	502	13	25
W/cheese	1 each	727	17	32
W/chili & cheese	1 each	653	21	28
W/sour cream & chives	1 each	405	7	18
Chili	1 cup	260	21	8
French fries	1 srvg	306	4	15
Frosty dairy desert	1 cup	354	7	13
Chocolate chip cookie	1 each	320	3	17

Source: Wendy's International, for most nutrient values.

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
ARBY'S				
Roast beef sandwiches				
Deluxe	1 each	486	26	23
Beef 'n cheddar	1 each	455	26	27
Chicken Sandwiches				
Chicken breast sandwich	1 each	509	26	29
Chicken salad sandwich	1 each	386	18	20
Chicken salad & croissant	1 each	472	22	36
Chicken club sandwich	1 each	621	26	32
Hot ham and cheese sandwich	1 each	292	23	14
Turkey deluxe sandwich	1 each	375	24	17
Baked potatoes				
Plain	1 each	290	8	<1
Deluxe, w/butter & sour cream	1 each	648	18	38
W/broccoli & cheese	1 each	541	13	22
W/mushrooms & cheese	1 each	506	16	22
Taco	1 each	619	23	27

FAT CONTENT OF FAST FOODS (continued)

Food Composition

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
Milkshakes				
Chocolate	1 each	451	10	12
Jamocha	1 each	368	9	11
Vanilla	1 each	330	11	12

Source: Arby's Incorporated, Atlanta Georgia for the basic nutrients.

BURGER KING				
Croissant Sandwiches				
With egg, bacon & cheese	1 each	335	15	24
With egg, sausage & cheese	1 each	538	19	41
With egg, ham & cheese	1 each	335	18	20
Whopper Sandwiches				
Whopper	1 each	640	27	41
Whopper w/ cheese	1 each	723	31	48
Double beef	1 each	850	46	52
Double w/ cheese	1 each	950	51	60
Whopper, Junior	1 each	370	15	17
Whopper, Junior w/ cheese	1 each	420	17	20
Hamburger	1 each	275	15	12
Cheeseburger	1 each	317	17	15
Bacon double cheeseburger	1 each	510	33	31
Chicken Sandwich	1 each	688	26	40
Chicken tenders	1 each	204	20	10
Ham & Cheese sandwich	1 each	471	24	23
Whaler fish sandwich	1 each	488	19	27
Pies				
Apple	1 each	125	3	12
Cherry	1 each	128	4	13
Pecan	1 each	113	5	20

Source: Burger King Corporation for basic nutrients.

DAIRY QUEEN				
Ice cream cones				
Small	1 each	104	3	4
Regular	1 each	240	6	7
Large	1 each	340	9	10
Dipped ice cream cones				
Small	1 each	190	3	9
Regular	1 each	340	6	16

FAT CONTENT OF FAST FOODS (continued)

Food Composition

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
DAIRY QUEEN continued				
Dipped ice cream cones				
Large	1 each	510	9	24
Sundaes				
Small	1 each	190	3	4
Regular	1 each	310	5	8
Large	1 each	440	8	10
Banana Split	1 each	540	9	11
Peanut buster parfait	1 each	740	16	34
Hot fudge brownie delight	1 each	600	9	25
Buster bar	1 each	460	10	29
Dilly bar	1 each	210	3	13
DQ ice cream sandwich	1 each	140	3	4
Milkshakes				
Small	1 each	490	10	13
Regular	1 each	710	14	19
Large	1 each	990	19	26
Malted milkshakes				
Small	1 each	520	10	13
Regular	1 each	760	14	18
Large	1 each	1060	20	25
Float	1 each	410	5	7
Freeze	1 each	500	9	12
Mr. Misty				
Regular	1 each	250	0	0
Kiss	1 each	70	0	0
Freeze	1 each	500	9	12
Float	1 each	390	5	7
Chicken sandwich	1 each	670	29	41
Cheeseburgers				
Single	1 each	410	24	20
Double	1 each	650	43	37
Triple	1 each	820	58	50
Hotdogs				
Regular	1 each	280	11	16
With cheese	1 each	330	15	21
With chili	1 each	320	13	20
Super hotdogs				
Regular	1 each	520	17	27
With cheese	1 each	580	22	34
With chili	1 each	570	21	32

Nutrition Curriculum
Unit #5
Function #VII
Activity #3

FAT CONTENT OF FAST FOODS (continued)

Food Composition

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
DAIRY QUEEN continued				
French fries, small	1 srvg	200	2	10
French fries, large	1 srvg	320	3	16
Onion Rings	1 srvg	280	4	16

Source: International Dairy Queen Inc, Minneapolis, MN.

Food Description	Measure	Energy (kcal)	Protein (gram)	Fat (gram)
JACK IN THE BOX				
Breakfast Jack sandwich	1 each	307	18	13
Canadian crescent	1 each	472	19	31
Sausage crescent	1 each	584	22	43
Supreme crescent	1 each	547	20	40
Pancakes breakfast	1 each	626	16	27
Scrambled egg breakfast	1 each	719	26	44
Hamburger	1 each	276	13	12
Cheeseburger	1 each	323	16	15
Jumbo Jack	1 each	485	26	26
Jumbo Jack w/ cheese	1 each	630	32	35
Bacon cheeseburger supreme	1 each	724	34	46
Swiss & baconburger	1 each	643	33	43
Ham & Swiss burger	1 each	638	36	39
Chicken supreme	1 each	601	31	36
Moby Jack sandwich	1 each	444	16	25
Club Pita	1 each	284	22	8
Tacos				
Regular	1 each	191	8	11
Super	1 each	288	12	17
Chicken strips dinner	1 each	689	40	30
Shrimp dinner	1 each	731	22	37
Pasta seafood salad	1 each	394	15	22
Hash brown potatoes	1 each	68	2	12
Onion Rings	1 each	382	5	23
Milkshakes				
Chocolate	1 each	330	11	7
Strawberry	1 each	320	10	7
Vanilla	1 each	320	10	6
Apple turnover	1 each	410	4	24

Source: Jack in the Box Restaurants, Foodmaker, Inc., San Diego, CA.

Nutrition Curriculum
Unit #5
Function #VII
Activity #4

NAME OF ACTIVITY: PALATABILITY OF MILK

GENERALIZATION: Excessive amounts of a nutrient are of no special nutritional benefit, and they may be harmful.

OBJECTIVES: Identify selected foods which are sources of saturated, monounsaturated, and polyunsaturated fats.
Identify selected foods which are dietary sources of cholesterol.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
How does fat content affect milk flavor?
Can you tell the difference between milks with different fat contents?
Can you substitute different milk products in recipes?

EQUIPMENT:
Whole Milk
2% Milk
Skim Milk
Dry reconstituted Milk
Milk Acceptability Chart
liquid measuring cup
calorie chart

PROCEDURES:
1. Measure out 1/4 cup of each of the samples of milk.
2. Complete the Milk Palatability Chart.
3. Compare the amount of calories contained in 1 cup of each of the four milks.

SUMMARY:
Which form of milk did you like best? Why?
Which form of milk did you like least? Why?
How did fat content affect the flavor?

Nutrition Curriculum
Unit #5
Function #VII
Activity #4

PALATABILITY OF MILK

1) Measure out 1/4 cup of each type of milk.

2) Observe color and aroma of each type of milk.
Mark the chart below with a +, -, or o to indicate like, dislike, or neutral reaction to color of each milk.

3) Taste (with small sips) each milk and mark taste preference for each with a +, -, or o.

4) Write down comments about each type of milk.

Milk Sample	Color	Flavor	Form	Comments
Whole				
2%				
Skim				
Dry Recon.				

Which form of milk did you like best? Why?

Which form of milk did you like least? Why?

How did fat content affect the flavor?

Compare the calorie content of each of the milks used.

RESOURCES

Ernest, N.D. & Cleeman, J. (1988). Reducing high blood cholesterol levels: Recommendations from the national cholesterol education program. Journal of Nutrition Education, 20, 23-36.

Hamilton, E. M., Whitney, E. N. & Sizer, F. S. (1988). Nutrition: Concepts and controversies (4th ed.). St. Paul, MN: West Publishing Co.

Home Economics Instructional Materials Center. (1982). The new nutrition. Lubbock: Texas Education Agency.

Medved, E. (1984). The world of food (4th ed.). Needham, MA: Prentice-Hall.

National Dairy Council. (1988). Nutritional and health effects of unsaturated fatty acids. Dairy Council Digest, 59 (no. 1).

Human Nutrition Information Services. (1986). Dietary guidelines for Americans - Avoid too much fat, saturated fat, and cholesterol. (Home and Garden Bulletin No. 232-3). Hyattsville, MD: United States Department of Agriculture.

Nutrition Curriculum
Unit 6

Eat Foods with Adequate Starch and Fiber

Nutrition Curriculum Unit Six

<Dietary Guidelines For Americans ** Eat Foods with Adequate Starch and Fiber>

VIII. Function: Demonstrate knowledge of complex carbohydrates and fiber, their dietary sources, and their functions in the body.

GENERALIZATIONS:

1. Unlike concentrated sugars and sweets, starchy foods provide vitamins and minerals as well as energy.

2. Starches from different sources behave differently.

3. Dietary fiber is the part of plants that humans cannot digest.

4. Different types of fiber function differently in the body. It is important to eat a variety of plant foods to benefit from effects of different kinds of fiber.

5. Possible benefits of dietary fiber for certain diseases are being studied.

OBJECTIVES:

The student will be able to:

A. Define the different classes of carbohydrates.

B. List the major functions of carbohydrates in the body.

C. Be able to list foods that are good sources of carbohydrates.

D. Classify foods according to the predominant carbohydrate.

E. Describe various types of carbohydrates in terms of taste and texture.

F. Explain the importance of increased fiber intake.

G. Experiment with increasing the fiber content of standard recipes and determine effects of this increase on product quality.

ADDITIONAL LEARNING ACTIVITIES:

1. Experiment with tapioca, pp. 46-49, Science Experiments You Can Eat.

2. Grape Jelly: How Pectin Acts, pp. 49-50, Science Experiments You Can Eat.

3. Observe carbohydrate intake of various individuals and represent this information in terms of table, graph or chart.

4. Hypothesize what the effects of too little or too much carbohydrate in the diet will be.

ADDITIONAL RESOURCES:

McWilliams, M. & Heller, H. (1984). The world of nutrition. Lexington: Ginn & Co. pp. 32-41; pp. 162-168.

Cobb, V. (1972). Science experiments you can eat. New York: Lippincott Co.

EAT FOODS WITH ADEQUATE STARCH AND FIBER

I. Classes Of Carbohydrates

A. Chemistry and classification of carbohydrates

1. Carbohydrates consist of carbon, hydrogen, and oxygen, with the hydrogen and oxygen in the same proportion as water (two hydrogen, and one oxygen). Carbohydrates are photosynthesized by plants from the carbon dioxide in the air and from water.
2. Carbohydrates are classified into three major groups:
   a. **Monosaccharides** - simple sugars - account for 10% of all dietary carbohydrates derived from digestion or breakdown of more complex carbohydrates. Monosaccharides are sweet and soluble. Fructose and galactose are converted to glucose in the liver. From this stage, glucose follows the metabolic pathways and is utilized where needed in the body.
      (1) **Glucose** - fruits, plant juices, sugar, corn syrup
      (2) **Fructose** - fruits, vegetables, honey, cane sugar, syrups
      (3) **Galactose** - no food has free galactose - component of milk sugar and seed coat of legumes.
   b. **Disaccharides** - yields two simple sugars upon breakdown. Disaccharides account for 35% of dietary carbohydrates. All three disaccharides are easily digested. They are crystalline, sweet, and easily soluble.
      (1) **Sucrose** - glucose + fructose. Source: table sugar (sugar cane and beets), fruit and plant juices.
      (2) **Lactose** - galactose + glucose. Source: milk of mammals.
      (3) **Maltose** - glucose + glucose. Source: product from breakdown of starch during germination or sprouting of cereal grains, also during animal digestion.
   c. **Polysaccharides**- complex carbohydrates composed of many sugar (may contain as many as 2,000 glucose units) which may be a straight chain (an amylase) or a branched chain (amylopectin). Polysaccharides represent 50% of dietary carbohydrates ingested.

EAT FOODS WITH ADEQUATE STARCH AND FIBER (continued)

(1) **Starch** - is a plant stored food supply. When the body digests starch, it changes first to dextrin, then to maltose, and then to glucose. Each plant synthesizes a starch characteristic of its species. Cooking makes the starch more available to digestive enzymes.

(2) **Dextrin** - is the intermediate product between starch and sugar. Starch is cleaved by enzymes during digestion or by action of dry heat.

(3) **Glycogen** - is a stored form of carbohydrates in animals, primarily in the liver and muscles. The adult human stores 3/4 pound of glycogen; 1/4 pound as liver glycogen, and 1/2 pound as muscle glycogen. Small amounts of glycogen can be found in almost every cell.

(4) **Cellulose** - is the structural framework of plant tissue. The human body lacks the digestive enzyme necessary to break its monosaccharide linkages. This indigestible residue contributes bulk (fiber) to the diet. Fiber is important in maintaining intestinal motility. A minimum of 100 mg. of fiber per kilogram of body weight per day (6 g. or 1/5 oz.) is needed to stimulate normal intestinal motility and normal elimination. If the diet is high in cellulose, it may speed the passage of food through the intestinal tract, resulting in less nutrient absorption. On the other hand, a diet low in fiber has been associated with increasing incidence of diseases of the intestinal tract such as diverticulosis and colon cancer.

II. Functions Of Carbohydrates In The Body

A. Carbohydrate is an indispensable source of energy.
   1. Provides fuel for muscular activity (including the heart)
   2. Provides fuel for the central nervous system
   3. Provides necessary fuel for liver functions
   4. Protein-sparing action
   5. Facilitates the oxidation of fatty acids
   6. Anti-ketogenic function

EAT FOODS WITH ADEQUATE STARCH AND FIBER (continued)

B. Dietary fiber contributes to normal elimination. Fiber may prevent hemorrhoids or cancer of the colon.

III. Dietary Sources Of Carbohydrates

A. Cereals and cereal products - flour, pasta, pastries, breads, cakes

B. Vegetables -
  1. Leaves and stalks - lettuce, asparagus - cellulose
  2. Roots - potatoes, beets, carrots, turnips, squash - starch
  3. Green leafy - cabbage, kale, chard - low in carbohydrate; 3.2 g per 1/2 cup
  4. Seeds - legumes, dried beans and peas, green and dry lima beans - high in carbohydrate; 21.2 g per 1/2 cup

C. Fruits - Carbohydrate content will vary according to processing methods. Fruits high in carbohydrates include bananas, dates, and figs. Fruits with a low carbohydrate content include rhubarb, strawberries, and watermelon.

D. "Concentrated sweets" - sugars, syrups, molasses, jams, jellies, beverages, candies, and honey.

IV. Carbohydrate Consumption
Sugar consumption equals 1/4 pound per person per day in the United States.
Currently about 46% of caloric intake comes from carbohydrates; 22% from complex carbohydrates and 24% from sugars.

V. Recommended Intake Of Carbohydrates

A. Dietary Guidelines recommend 58% of total caloric intake from carbohydrates.
  1. Of the 58%, 48% should come from complex carbohydrates such as cereals, whole grain breads, potatoes, and vegetables.
  2. Of the 58%, only 10% or less should be from refined and processed sugars added to foods and "concentrated sweets."

Nutrition Curriculum
Unit #6
Function #VIII
PRETEST

NUTRITION: CARBOHYDRATE TEST

TRUE/FALSE: If a statement is true, write TRUE in the blank. If a statement is false, write FALSE in the blank.

__________ 1. Grain products are especially high in calories.
__________ 2. Rye is the staple food for over half of the world's population, and it produces the highest yield of any cereal grain.
__________ 3. When buying grain products, select products labeled "whole grain" or "enriched" for good nutritional value.
__________ 4. As cereals are cooked, the starch granules absorb water, causing them to expand or swell.
__________ 5. A nutrient is a chemical substance in food which nourishes the body.
__________ 6. Glucose is the sweetest of all sugars.
__________ 7. Cellulose is a carbohydrate which provides bulk in the diet.

MULTIPLE CHOICE: Choose the BEST answer and write the corresponding letter in the blank.

__________ 8. Which of the following is not a carbohydrate?
  a. Fructose
  b. Dextrin
  c. Amino Acid
  d. Cellulose

__________ 9. Nearly all carbohydrates are absorbed by the body in the form of:
  a. Disaccharides
  b. Monosaccharides
  c. Amino Acids
  d. Diglycerides

__________ 10. After nutrients are absorbed by the body, they undergo the chemical processes known as:
  a. Digestion
  b. Absorption
  c. Metabolism
  d. Peristalsis

__________ 11. The outer part of a grain kernel that is made of several thin layers of fiber is called the:
  a. Germ
  b. Endosperm
  c. Bran
  d. None of the above

__________ 12. The grain most often eaten in United States that is used in making flour, breakfast cereals, breads and pasta is:
a. Rice
b. Wheat
c. Oats
d. Corn

FILL IN THE BLANK

13. - 14. The simple carbohydrates are ____________ and ____________.

15. The ______________ are considered complex carbohydrates.

16. - 18. Three important monosaccharides in nutrition are
_______________, _______________, and _______________.

19. - 20. Two types of polysaccharides in foods that are important in nutrition are _______________ and
_______________.

21. - 24. List four functions of carbohydrates in the body.
1. ____
2. ____
3. ____
4. ____

25. - 27. List three end products of carbohydrate digestion in the small intestine.
1. ____
2. ____
3. ____

28. Foods from _______________ sources are the best source of carbohydrates.

29. For most Americans, the amounts of __________________ carbohydrates in the diet should be increased.

NUTRITION: CARBOHYDRATE <Answer sheet>

1. False
2. False
3. True
4. True
5. True
6. False
7. True
8. C.
9. B.
10. C.
11. C.
12. B.

13. - 14. monosaccharides and disaccharides
15. polysaccharides
16. - 18. fructose, glucose, galactose
19. - 20. starch and fiber
21. - 24. provide energy
spare protein
help the body use fats
help in elimination of waste products
25. - 27. galactose, glucose, and fructose
28. plant
29. complex

Nutrition Curriculum
Unit #6
Function #VIII
Activity #1

NAME OF ACTIVITY: STUDY OF THE PHYSICAL PROPERTIES OF STARCHES FROM COMMON FOOD SOURCES

GENERALIZATION: Starches from different sources behave differently.

OBJECTIVES: Describe various types of carbohydrates in terms of taste and texture.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
How do the starch molecules differ?
How are the starch molecules alike?
What is the effect of liquid on the starch?

EQUIPMENT:
1/2 teaspoon of each of the following:
cornstarch
oatmeal
wheat-flour
barley
cornmeal
rice
macaroni
Microscope, slides, iodine

PROCEDURES:

1. Observe dry starches and starch-containing products under the microscope.
2. Prepare a microscope slide of cornstarch and a small amount of water. Add one drop of iodine and stir. Observe the slide under the microscope.
3. Repeat step 2 using cornstarch and then barley.
4. What differences and similarities do you note among the various sources?

SUMMARY: Most starches are mixtures of amylase and amylopectin. Starches from different sources behave differently. Starch granules are completely insoluble in cold water.

Nutrition Curriculum
Unit #6
Function #VIII
Activity #1

EAT FOODS WITH ADEQUATE STARCH AND FIBER

EXPERIMENT: To study the physical properties of starches from common sources.

MATERIALS: 1/2 tsp of each: cornstarch, cornmeal, oatmeal, rice, wheat flour, macaroni, barley

PROCEDURE: Observe each of the dry starches and starch-containing products under the microscope. Draw and label what you see in each instance. Note how the source of the starch affects the appearance of the starch granules.

Cornstarch

Cornmeal

Oatmeal

Rice

Wheat flour

Macaroni

Barley

PART II.

Prepare microscope slides of cornstarch and barley by mixing a very small amount of the starch with cold distilled water. Add 1 drop of dilute iodine solution and stir thoroughly. Use one drop of the mixture for each slide. Observe under the microscope and draw what you see.

Cornstarch

Barley

CONCLUSION:

What does this experiment show with regard to size and shape of starch granules?

Nutrition Curriculum
Unit #6
Function #VIII
Activity #2

NAME OF ACTIVITY: THICKENING AGENT EXPERIMENT

GENERALIZATION: Starches from different sources behave differently.

OBJECTIVES: Describe various types of carbohydrates in terms of taste and texture.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS: What causes the thickening of pudding, gravy, and sauces?

EQUIPMENT:

measuring spoons
measuring cups
hot plate
sauce pan
water
all-purpose flour
cake flour
corn starch
tapioca

PROCEDURES:

1. Use 2 teaspoons of each of the following thickening agents and 1/2 cup cool water.
2. Add a small amount of water to the thickening agent to moisten.
3. Add the remaining water gradually, stirring until all lumps are gone.
4. Cook over direct heat, stirring constantly, but not vigorously, until the mixture thickens.
5. Place in custard cup. Allow to cool slightly before evaluation.

SUMMARY: Because starches behave differently, each has a specific use in food preparation according to its gel consistency and clarity.

Nutrition Curriculum
Unit #6
Function #VIII
Activity #2

THICKENING AGENTS EXPERIMENT

PROCEDURES:

1. Use 2 teaspoons of each of the following thickening agents and 1/2 cup cool water.
2. Add a small amount of water to the thickening agent to moisten.
3. Add the remaining water gradually, stirring until all lumps are gone.
4. Cook over direct heat, stirring constantly, but not vigorously, until the mixture thickens.
5. Place in custard cup. Allow to cool slightly before evaluation.

THICKENING AGENT	CONSISTENCY OF GEL		CLARITY OF PASTE	
ALL-PURPOSE FLOUR				
CAKE FLOUR				
CORN STARCH				
TAPIOCA				

EVALUATION:

Describe the consistency of the gel and the clarity of the thickening agent in the chart above.

CONSISTENCY OF GEL: rate the products from 1 to 4, with 1 being the most firm and 4 being the least firm.

CLARITY OF PASTE: rate the products from 1 to 4, with 1 being the most clear, and 4 being the least.

Nutrition Curriculum
Unit #6
Function #VIII
Activity #3

NAME OF ACTIVITY: INCREASE THE FIBER CONTENT IN RECIPES

GENERALIZATION: Dietary fiber is the part of plants that humans cannot digest.

OBJECTIVES: Explain the importance of increased fiber intake.
Experiment with increasing the fiber content of standard recipes and determine effects of this increase on product quality.

BACKGROUND INFORMATION: Refer to Unit Outline.
Whole wheat flour has a higher fiber content than all all-purpose flour. Whole wheat flour can be substituted for all-purpose flour on a cup per cup basis.

DISCUSSION QUESTIONS: How can your increase the fiber content of your diet?

EQUIPMENT:

2 small mixing bowls
scales
wire whisk
metric measuring cup, glass
muffin pans

Ingredients:
All-purpose flour
Whole wheat flour
Wheat bran
Sugar
Baking powder
Salt
Egg & Milk
Salad oil

PROCEDURES:

1. Prepare standard recipe.
2. Prepare 1st recipe using 3/4 cup & 1 tablespoon (107 g) of whole wheat flour and 2 3/4 cups & 1 tablespoon (323 g) of all-purpose flour.
3. Prepare 2nd recipe using 1 1/2 cups & 2 tablespoons (215 g) of whole wheat flour and 1 3/4 cups & 2 tablespoons (215 g) of all-purpose flour.
4. Prepare 3rd recipe using 3 1/4 cups (430 g) of whole wheat flour.

INCREASE THE FIBER CONTENT IN RECIPES (continued)

SUMMARY: Fiber content can be increased in the diet using different brans (e.g., oat bran) or the addition of fruit (e.g., mashed banana, chopped apples). Each type of fiber has a different function in the body. As demonstrated by recent interest in oat bran, current research is changing our knowledge and understanding of the role fiber has in overall health maintenance.

INCREASE THE FIBER CONTENT OF RECIPES

Standard Recipe:
Muffins
12 muffins

430 ml	1 3/4 cups all-purpose flour
60 ml	1/4 cup sugar
12 ml	2 1/2 tsp baking powder
4 ml	3/4 tsp salt
	1 egg
180 ml	3/4 cup milk
80 ml	1/3 cup salad oil

Combine the dry ingredients in a medium-size mixing bowl. Beat the egg well in a separate small bowl. Mix in the milk and oil. Pour the liquid mixture into the center of the dry ingredients. Stir quickly for only a few strokes, until the dry ingredients are moistened. The batter will look very lumpy. Do not overstir. This would make the muffins tough. Line the muffin pan with paper baking cups or grease the pans. With waxed paper, coat the inside of each cup in the pan with a thin film of oil or shortening. Fill the cups 2/3 full with batter.
Bake at 400 degrees F. (200 degrees C.) for about 25 minutes.

Rate your products

Standards for muffins	1st	2nd	3rd
Size of all muffins is the same (batter should be double)			
Shape is regular, tops are well-rounded with no peaks or cracks			
Crust is tender, with a slightly rough but shiny surface			
Inside color is streak-free and creamy or pale yellow			
Texture is light, tender, and slightly moist. It is even grained with no holes(tunnels).			
Taste is mild. (Sweet flavor)			

Which muffins did you prefer? Why?

Nutrition Curriculum
Unit #6
Function #VIII
Activity #4

NAME OF ACTIVITY: COOKING CHANGES THE PROPERTIES OF VEGETABLES.

GENERALIZATIONS: Different types of fiber function differently in the body.
It is important to eat a variety of plant foods to benefit from effects of different kinds of fiber.

OBJECTIVES: Be able to list foods that are good sources of carbohydrates.
Classify foods according to the predominant carbohydrate.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS: What effect does cooking have upon vegetables?
Does it increases or decrease their appeal?

EQUIPMENT:
3 or more serrated knives
large saucepan
steaming rack
hot plate
slotted spoon
fork and plate for each student
Data sheet

Ingredients:
1 medium carrot
2 stalks celery
4 asparagus stalks
6 brussel sprouts
1/4 head cabbage
1/4 head cauliflower
1 zucchini squash
1 yellow summer squash
2 dozen pea pods
2 ears corn (instructor: cut into 2" portions)

PROCEDURES:

1. Have lab units clean and prepare vegetables in the following manner:
   carrot - cut into 1/2" slices
   celery - cut into 1" pieces
   asparagus stalks - 1" pieces
   brussel sprouts - leave whole
   cabbage - dice into 1" squares

COOKING CHANGES THE PROPERTIES OF VEGETABLES (continued)

cauliflower - break into 1" flowerets
squash (zucchini and yellow squash) - cut into 1" slices
corn - (instructor: cut into 2" portions)
pea pods - no cutting necessary

2. Students can then place 1/2 of each vegetable in the saucepan and time the cooking process. Save the other 1/2 for evaluation uncooked. Carrots and celery take 25-30 minutes to cook and the other vegetables take 15-20 minutes to cook.
3. Students remove cooked vegetables from sauce pan and evaluate them based on the categories of the data sheet. Rate from 1 - 10 for each category.

SUMMARY: Heat decreases water content in the plant cells causing the fruit or vegetable to lose its stiffness and become soft. Cooked vegetables are easier to eat than raw vegetables (especially for young children and the elderly).

Nutrition Curriculum
Unit #6
Function #VIII
Activity #4

COOKING CHANGES THE PROPERTIES OF VEGETABLES

DATA SHEET:

	COOKED				RAW			
	TEXTURE	APPEARANCE	FLAVOR	PREFERENCE	TEXTURE	APPEARANCE	FLAVOR	PREFERENCE
Carrot								
Celery								
Asparagus								
Brussel Sprouts								
Cabbage								
Cauliflower								
Broccoli								
Zucchini								
Yellow Squash								
Corn								
Peas								

What parts of plants do we eat?

Why do we eat vegetables?

How does heat change vegetables?

What is cellulose?

How does eating raw vegetables help us to digest other foods?

What new vegetables have you learned about?

Which vegetables do you prefer cooked?/raw?

RESOURCES

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Nutrition Curriculum
Unit 7

Avoid Too Much Sugar

Nutrition Curriculum Unit Seven

<Dietary Guidelines for Americans ** Avoid Too Much Sugar>

IX. Function: Demonstrate knowledge of simple sugars and explain the effects of excess consumption on the human body.

GENERALIZATIONS:

1. Sugars are simple carbohydrates found naturally in some food.

2. In the Dietary Guidelines, "sugar" means all forms of caloric sweeteners, including white sugar, brown sugar, raw sugar, corn syrup, honey, and molasses.

3. Sugars are added to foods during processing, preparation, or at the table.

4. The major health problem related to eating too much sugar is tooth decay.

OBJECTIVES:

The student will be able to:

A. Define the terms "simple sugar," monosaccharide, disaccharide, polysaccharide.

B List food sources of sugar, including foods with hidden sugar.

C. Cite characteristics common among high sugar foods.

D. List the effects of excess sugar consumption on the body.

E. Discriminate between the artificial sweeteners and natural sugars using the senses.

F. Collect observations and record data for recipes with decreased sugar and those with no decrease.

G. Hypothesize what the effect of changing the sugar content of standard recipes will be.

H. Modify menus and recipes to reduce the amount of sugar they contain.

I. Interpret data from the experiment and discuss results and possible errors.

ADDITIONAL LEARNING ACTIVITIES:

1. Design a procedure to experiment with decreasing sugar in a standard recipe.

ADDITIONAL RESOURCES:

McWilliams, M. & Heller, H. (1984). The world of nutrition. Lexington: Ginn & Co. pp. 154-159.

AVOID TOO MUCH SUGAR

I. Background Information About Sugar

- A. Major Cause of Tooth Decay
    1. Acid formed by bacteria erodes enamel.
    2. Sticky foods stay on the teeth longer.

- B. Sugars are Simple Carbohydrates
    1. Monosaccharides: fructose, glucose, galactose
    2. Disaccharides: sucrose, maltose, lactose
    3. Polysaccharides: not considered sugars, non-sweet

- C. In The Dietary Guidelines, "Sugar Means All Forms of Caloric Sweeteners."
    1. Natural sweeteners
    2. Sugar alcohols
    3. Artificial sweeteners

II. Sources of Sugar

- A. Sugars are Found Naturally in Some Foods
    1. **Granulated sugar** is made from sugar cane or sugar beets.
    2. **Brown sugar** contains molasses, a by-product of the cane sugar refining process. Molasses gives brown sugar its distinguishing flavor, aroma and color. Although brown sugar contains a few traces of vitamins and minerals, it is almost as low in nutritional value as white sugar.
    3. **Honey** is made by bees. It is more liquid and is sweeter than sugar. Honey contains some traces of vitamins and minerals, but is really not more nutritious than white sugar. You cannot directly substitute honey for sugar, but to substitute sugar for honey, you need 1/4 cup liquid and 1 1/4 cups sugar for each cup of honey required.
    4. **Molasses** is a dark, sticky syrup that is manufactured as a by-product in sugar refining. Demand for molasses has increased because of the growing interest in natural products with less refined sugar. Molasses is less sweet than sugar. Substituting molasses for sugar requires experimentation. The equivalent is one cup molasses equals 3/4 cup granulated white sugar.

AVOID TOO MUCH SUGAR (continued)

5. **Corn syrup** is a combination of concentrated glucose and water. Corn syrup makes creamy candy products by preventing sugar crystal formation. Corn syrup should not be substituted for sugar.
6. **Confectioners' (Powdered) sugar** is a finely powered white sugar.
7. **Sugar alcohols** are a type of natural sweetener which is absorbed and metabolized to glucose more slowly than the monosaccharides and disaccharides. These sweeteners do not contribute to tooth decay because they are not readily utilized by ordinary mouth bacteria. Although product may say sugar-free, if it contains sugar alcohols, it is not necessarily calorie-free. Sugar alcohols contain as many kilocalories per gram as sucrose.
   The types of sugar alcohols are:
   a. **Mannitol** is used rarely because it causes diarrhea. (The sugar is not digested quickly enough, and bacteria in the intestine start to digest mannitol for their own use. The bacteria multiply and attract water and produce an irritating waste which causes the diarrhea.)
   b. **Sorbitol** is one-half as sweet as sucrose, and therefore takes twice as many kilocalories for the same sweetness. It can also cause diarrhea.
   c. **Xylitol** is as sweet as fructose, so less can be used for the same sweetness. Sugar alcohol does not support cavity producing bacteria; in fact, it inhibits their growth.
   d. **Maltitol** has a sweetness equal to about 90 percent of sucrose. Since maltitol is expensive to manufacture from maltose, it is rarely used.
8. Other sugar terms: corn sweeteners, high-fructose corn syrup, maple sugar, raw sugar, turbinado sugar

E. Artificial Sweeteners
   1. They are non-nutritive.
   2. They furnish no calories.
      a. **Saccharin** is a chemical sweetener which has been around since before 1900. In 1977, studies linked saccharin to an increased risk of cancer. Under law, any substance shown to cause cancer must be banned. At the time the studies were made public, no other no-calorie sweeteners were available. Congress gave temporary permission for saccharin to be used. All products which contain saccharin must have an informational warning label stating the potential link to cancer.

AVOID TOO MUCH SUGAR (continued)

b. **Cyclamates** are chemical sweeteners used for about twenty years. Their use was banned in 1970 because of a possible link to cancer. In Canada, saccharin is banned, and cyclamates are used.

c. **Aspartame** is a sweetener made from the amino acids phenylalanine and aspartic acid, substances which are natural to our bodies. Aspartame has the same calories per teaspoon as sugar, but is 180 times sweeter than sugar. Less can be used to give the same sweetness, making aspartame virtually calorie free. Scientists are still unsure what the long term effects of unlimited aspartame use will be. People with a disease called PKU (Phenylketonuria) must be careful not to eat too many products with aspartame because it can cause severe mental retardation.

Nutrition Curriculum
Unit #7
Function #IX
PRE/POST TEST

SUGAR: Fact or Fiction

To get an idea of what you already know about sugar and your diet, take this quiz. After the unit on sugar, try the quiz again to see how much you have learned.

True False

____ ____ 1. A major problem with diets high in sugar is that the foods high in sugar may replace more nutritious foods.

____ ____ 2. Snacking on dried fruit is less harmful to the teeth than drinking a fruit drink.

____ ____ 3. It is necessary to use artificial sweeteners to avoid too much sugar in your diet.

____ ____ 4. The average 12 fluid ounce cola drink contains about 9 teaspoons of sugar.

____ ____ 5. Many foods can be made with less sugar without harming their taste or quality.

____ ____ 6. The total amount of added sugar Americans eat has gone down in recent years.

____ ____ 7. People who eat a lot of sugar are almost always obese.

____ ____ 8. For nearly all foods, manufacturers must list any added sugars on the ingredient label.

____ ____ 9. High sugar foods and drinks improve athletic performance.

____ ____ 10. Honey and brown sugar are much more nutritious than table sugar.

SUGAR: Fact or Fiction <Answer Sheet>

1. True
2. False: Sugars in sticky or chewy foods, such as dried fruit and chewy candy, are more damaging to the teeth than sugar in drinks.
3. False: With knowledge of sugar sources and good planning, it is not necessary to use artificial sweeteners to avoid too much sugar in your diet.
4. True
5. True
6. False: Even though use of table sugar has decreased, the increase in corn sweeteners has resulted in a small overall increase in sugar intake.
7. False: Obesity results from taking in more calories than used, regardless of the source.
8. True
9. False: Sugary foods increase insulin release, lowering blood sugar, which combined with decreased blood sugar due to exercise may cause fatigue.
10. False: Honey and brown sugar contain only traces of some vitamins and minerals. These amounts are insignificant.

Nutrition Curriculum
Unit #7
Function #IX
Activity #1

NAME OF ACTIVITY: AMOUNT OF SUGAR IN UNPROCESSED FOOD

GENERALIZATION: Sugars are simple carbohydrates found naturally in some foods.

OBJECTIVES: List food sources of sugar, including foods with hidden sugar.
Cite characteristics common among high sugar foods.

BACKGROUND INFORMATION: Some foods are naturally sweet. Fruit and some vegetables contain fructose, sucrose and glucose. Milk and dairy products contain lactose. Cereals and dried peas and beans (legumes) contain small amounts of maltose. These foods, however, have other important nutrients - vitamins, minerals, protein and fiber.

DISPLAY OR BULLETIN BOARD - Display pictures, models or actual foods and the amount of sugar they contain with sugar cubes (one sugar cube is approximately equivalent to one teaspoon of sugar).

FOOD	SERVING SIZE	SUGAR CUBES*	SERVINGS PER DAY	DAILY INTAKE
MILK	1 CUP	3	4	12
VEGETABLE	1/2 CUP	1	2	2
FRUIT	1 MEDIUM	3	3	9
BREAD	1 SLICE	1	5	5
MEAT	3 OUNCES	0	2	0
TOTAL				28

*Cubes or teaspoons of sugar per serving.

This is somewhat more than 1/2 cup. Sugar starts adding up when one considers the sugar added in food processing (70% of our dietary sugar is added by food processors). Soft drinks, sweetened beverages, sugary foods, sweet desserts and bakery products provide most of the added sugar in our diets.

DISCUSSION QUESTIONS: What foods contain more sugar naturally?
Are all sugars alike?
How can food selection regulate amount of sugar consumed?

AMOUNT OF SUGAR IN UNPROCESSED FOODS (continued)

EQUIPMENT: Food Diary from Unit Two.

PROCEDURES:

1. Using the food diary have students list servings of milk, vegetables, fruit, bread and meat with amounts of sugar they contain.
2. Have students add foods they consumed to the class display, using pictures, models, or foods with the representative number of sugar cubes worth of sugar they contain.

SUMMARY: A balanced diet with no added sugar contains a significant amount of table sugars.

Nutrition Curriculum
Unit #7
Function #IX
Activity #2

NAME OF ACTIVITY: USING FOOD LABELS TO DETERMINE SUGAR CONTENT OF PROCESSED FOODS

GENERALIZATION: Sugars are added to food during processing, preparation, or at the table.

OBJECTIVES: List food sources of sugar, including foods with hidden sugar.
Cite characteristics common among high sugar foods.

BACKGROUND INFORMATION: Refer to Unit Outline.
Sugar is listed on food labels by many different names. Ingredients must be listed by weight, from greatest to least.

DISCUSSION QUESTIONS: How many words from the "Hidden Sugar" list are found on your ingredient list?
What are they?
What foods contain the largest amounts of sugar?

EQUIPMENT: "Hidden Sugar" handout
"How Sweet" handout
Charts: Nutritive Value of Foods

PROCEDURES:

1. Have students bring ingredient lists from a variety of processed foods to class.
2. Students, working in groups, should note product, number of sugars listed, and order of ingredients listed.
3. Using food labels, compare foods that are processed differently (i.e. canned peaches in heavy vs. light syrup) in terms of caloric value.
4. Have students compare sugar as listed on ingredient panels of certain cereals with the amounts given on "How Sweet" handout. How do they differ? Why would food manufacturers choose to list amount of sugar in grams on their labels instead of teaspoons?

SUMMARY: A sugar word placed first, second, or third in the list of ingredients indicates that the food contains a significant amount of sugar.

Nutrition Curriculum
Unit #7
Function #IX
Activity #2

USING FOOD LABELS TO DETERMINE SUGAR CONTENT OF PROCESSED FOODS

HIDDEN SUGAR LIST

beet sugar
brown sugar
cane sugar
confectioner's sugar
corn sugar
corn sweetener
corn syrup
dextrin
dextrose
disaccharides
fructose
galactose
glucose
granulated sugar
high-fructose corn syrup
honey
invert sugar
lactose
malt
maltose
mannitol
maple sugar
maple syrup
molasses
monosaccharides
natural sugar
natural sweeteners
raw sugar
refined sugar
simple sugar
sorbitol
sorghum

Nutrition Curriculum
Unit #7
Function #IX
Activity #2

USING FOOD LABELS TO DETERMINE SUGAR CONTENT OF PROCESSED FOODS

HOW SWEET?

SUGARY FOODS	TSP
CONDIMENTS	
1 tsp jam or jelly	1
1 tbsp maple syrup	3
1 tsp honey	1
1 tbsp catsup	1/2
1 tbsp relish	1
CANDY	
chewing gum - 2 sticks	1
cough drop -2	1
Lifesaver - 2	1
Starburst Fruit Chew	1
Bubble Yum - 1 piece	2
Now and Later - 1	2
Peanut M&M's - 14	3
chocolate bar with almonds - 1 oz	3
Nestle's Crunch - 1 oz	3
Snickers - 1 oz	3
Mars Bar - 1 oz	3
milk chocolate bar - 1 oz	3-5
Plain M&M's - 31	4
Royals Mint Chocolate - 1 oz	4
Milky Way - 1 oz	4
chocolate fudge - 1 1/2" sq	4
Reese's Peanut Butter Cup - 1.6 oz	5
cotton candy - 1 cone	5
marshmallows - 4 large	5
jelly beans - 10	7
DESSERTS	
1/12 iced two-layer chocolate cake	15
1/12 angelfood cake	6
1/10 sponge cake	6
crumb coffeecake - 3.2 oz	3

SUGARY FOOD	TSP
BREAKFAST CEREAL	
1 oz Shredded Wheat	0
Puffed Rice	0
Puffed Wheat	0
Nutri-Grain	0
1 oz Cheerios	1/2
Chex cereals	1/2
Kix	1/2
Kellogg's Corn Flakes	1/2
1 oz Special K	1
Product 19	1
Rice Crispies	1
Total	1
Wheaties	1
Grape Nuts	1
Life	1
40% Bran Flakes	1
All-Bran	1
1 oz Granola, Plain	1 1/2
sweetened cereals	2 1/2
Alpha Bits	3
Lucky Charms	4
Super Orange Sugar Crisp	5
BEVERAGES	
12 oz fruit drink, -ade, or punch	12
12 oz soft drink	9-12
8 oz Kool-Aid, sweetened	6
8 oz Tang	7 1/2
5 oz chocolate milk	6
8 oz eggnog	4 1/2
DAIRY DESSERTS	
1/2 cup ice cream	3
1/2 cup ice milk	3
1/2 cup lowfat frozen yogurt	4
1/2 cup sherbet	7
3 oz ice cream sandwich	4
10 oz ice cream soda	6
8 oz lowfat vanilla yogurt	4

Nutrition Curriculum
Unit #7
Function #IX
Activity #2

USING FOOD LABELS TO DETERMINE SUGAR CONTENT OF PROCESSED FOODS

HOW SWEET? (continued)

SUGARY FOODS	TSP
DESSERTS continued	
cupcake with icing - 2 1/2" dia	3
Twinkie - 1	5
strawberry shortcake, whipped cream - 3.8 oz	8
Danish pastry - 2.3 oz	1 1/2
doughnut - 1.6 oz	2-4
cream puff or eclair with icing - 3.5 oz	3-5
1/2 cup Jello	4
Popsicle - 1	4 1/2
COOKIES	
graham crackers - 2	1
brownie - 2" X 2" X 3/4"	3
molasses cookie - 1	2
gingersnaps, other plain cookies 1 med	1
oatmeal cookies - 2	1
macaroons - 1 lg or 2 sm	3

SUGARY FOODS	TSP
DAIRY DESSERTS continued	
8 oz lowfat fruit yogurt	7
1 cup ice cream sundae	10
11 oz thick milkshake	10
1/2 cup chocolate pudding	4
PIES	
Blueberry or Cherry Pop-Tart 1.8 oz	3
fruit pies - 4.6 oz	4
coconut custard pie - 4.6 oz	4
choc.cream pie - 4.6 oz	7 1/2
lemon meringue pie - 4.6 oz	8
pecan pie - 4.6 oz	12
SWEETENED FRUIT & FRUIT IN SYRUP	
1/2 cup frozen sweetened fruit	6
1/2 cup fruit canned in heavy syrup	4
1/2 cup fruit canned in light syrup	2

Data from:

USDA Human Nutrition Information Service.(1988). Dietary Guidelines and Your Diet: Home Economics Teacher's Guide.

Zeller and Jacobson.(1987). Eat, Drink and Be Healthy!

Nutrition Curriculum
Unit #7
Function #IX
Activity #3

NAME OF ACTIVITY: TOOTH DECAY EXPERIMENT

GENERALIZATION: The major problem related to eating too much sugar is tooth decay.

OBJECTIVES: List the effects of excess sugar consumption on the body.
Interpret data from the experiment and discuss results and possible errors.

BACKGROUND INFORMATION: Acid formed by normal mouth bacteria as a by-product of digesting sugar causes the eating away of tooth enamel, which is made of calcium. The formation of this acid begins almost immediately after sugar enters the mouth. Within 15 to 20 minutes maximum acid formation occurs. Brushing teeth immediately after eating sugary foods helps prevent acid formation, as does rinsing the mouth with water. Eating sweets with a meal rather than by themselves also prevents full acid formation because the other foods and beverages help remove the sugar from the teeth.

Since this tooth is no longer in a mouth, bacteria are not part of the decay action in this experiment. In addition to sugar, colas contain a powerful acid, phosphoric acid, which can dissolve teeth by itself. As a result, colas are more detrimental to teeth than soft drinks containing only sweeteners.

DISCUSSION QUESTIONS:
How many students have seen a decayed tooth?
How many students have had dental caries?
How did it feel having them filled?
What did your dentist or doctor tell you about healthy teeth?

EQUIPMENT:
a tooth (baby tooth or discarded tooth from a dentist or dental surgeon)
a glass or custard cup
cola drink with sugar

TOOTH DECAY EXPERIMENT (continued)

PROCEDURES:

1. Have students observe tooth for color, enamel coating and any defects.
2. Place the tooth in a glass of cola. Note the time and date, and record any immediate observations.
3. Check the tooth on a periodic basis. How long does it take the tooth to be eaten into?
4. How does the tooth look? What changes have occurred?
5. Follow-up questions:
   This is what occurred when only sugar and phosphoric acid acted on the tooth.
   What would have happened if the tooth had been in someone's mouth?
   There is sugar in milk. Why is giving a baby a bottle to go to sleep with not recommended?
   What might be done to lessen the effect of sugar on the teeth? Are these procedures that could be done at home? At school? In an eating establishment?

SUMMARY:

An isolated tooth is probably free of bacteria.
This experiment simulates the action of bacterially-produced acid. Phosphoric acid is present in the cola syrup.

Nutrition Curriculum
Unit #7
Function #IX
Activity #4

NAME OF ACTIVITY: SUGAR SUBSTITUTION IN LEMONADE

GENERALIZATION: In the Dietary Guidelines, "sugar" means all forms of caloric sweeteners, including white sugar, brown sugar, raw sugar, corn syrup, honey and molasses.

OBJECTIVE: Discriminate between the artificial sweeteners and natural sugars using the senses.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

Have you ever substituted ingredients in recipes?
Have the substitutions been successful?
What differences did these substitutions make in the final product?

EQUIPMENT:

- small paper cups (label for the different sweeteners used)
- pitchers of lemonade
- lemonade recipe
    - lemon juice
    - sugar
    - honey
    - corn syrup
    - confectioner's sugar
    - artificial sweeteners (aspartame, saccharin)
- rating sheets
- pencils

PROCEDURES:

1. Pass out lemonade recipe and rating sheets.
2. Provide each student with a sample of each of the five lemonades. Use numbers to identify the different types of lemonades.
3. Have students use their senses to observe the lemonade samples. Have them record their observations for each sample.
4. Have students identify each sweetener based on their observations.
5. Tally responses for the class.

SUGAR SUBSTITUTION IN LEMONADE
(continued)

6. Instructor then identifies the sweetener used for each lemonade sample.
7. Follow-up questions:
   How well did the class recognize the flavor of different sweetening agents?
   How do other sweeteners differ from table sugar in sweetness, flavor, mouth feel, odor and color?
   How might these different sweeteners differ in baking?
   What is the benefit to consumers of knowing how to substitute similar ingredients?
   What is the benefit to the food industry?

SUMMARY: Sweeteners can be substituted in recipes with varying degrees of success. Flavor and mouth feel are two components that are affected by substitutions. Some artificial sweeteners deteriorate when heated; therefore, products subjected to heat may develop off-flavors.

SUGAR SUBSTITUTION IN LEMONADE

Lemonade Recipe

For each cup of water, add:
1 1/2 Tablespoon of lemon juice
4 Tablespoons of sugar (or one of the substitutes below)
1/8 teaspoon of salt

The sugar and water do not need to be boiled, but the quality of the lemonade is improved if they are. Boil the sugar and water for 2 minutes. Chill the syrup, and add the lemon juice.

Sugar Substitutes

4 Tablespoons of honey
8 Tablespoons of corn syrup
7 Tablespoons of confectioner's sugar (Make a syrup with this one to cook the corn starch added to the confectioner's sugar)
artificial sweetener (according to package instructions, most of these do not tolerate cooking well).

* * * * * *

1. Take a sample of each of the lemonades labeled 1 - 5.
2. Use your senses to observe the different lemonade samples.
3. Record your observations in the Rating Sheet (below).
4. Write down which sweetener you think is used in each sample.

SUGAR SUBSTITUTION IN LEMONADE
(continued)

Lemonade Rating Sheet

SAMPLE	COLOR	ODOR	FLAVOR	SWEETNESS	MOUTHFEEL	SOURCE	OVERALL RATING

Nutrition Curriculum
Unit #7
Function #IX
Activity #5

NAME OF ACTIVITY: SODA POP SUGAR CONTENT

GENERALIZATION: Sugars are added to foods during processing, preparation, or at the table.

OBJECTIVE: List food sources of sugar, including foods with hidden sugar.

BACKGROUND INFORMATION: Sweetened beverages account for the greatest intake of sugar in the United States, amounting to about 38 gallons per person in 1980. This was more than the combined total of milk, tea, fruit juice, and vegetable juice consumed per person. This experiment can help students visualize what they are consuming and how little these beverages offer other than taste and calories.

DISCUSSION QUESTIONS: How many students drink soda or sweetened drinks daily? 3-5 times per week? 1-2 times per week? less than once a week? Tally the numbers on the chalkboard.

Ask the same questions about milk and unsweetened fruit and vegetable juice consumption. Tally the numbers on the chalkboard.

It is up to each one of us to choose what we will drink with meals and for snacks.

This one can of orange soda was made using a recipe. What do you think it is made of? Write down ideas on the board.

EQUIPMENT:

- 12 fluid ounces can of orange soda
- 12 fluid ounces can of club soda
- table sugar
- orange extract
- red and yellow food coloring
- 12 fluid ounces glass or pitcher
- measuring spoons
- mixing spoons
- small paper cups for tasting

SODA POP SUGAR CONTENT
(continued)

PROCEDURES:

1. Have a student in class write the ingredients in the orange soda on the blackboard.
2. Have another student measure out 12 fluid ounces of club soda (1 1/2 cups).
3. Ask class to determine which ingredient in the orange soda gives it sweetness, flavor, and color.
4. The standard 12 fluid ounces soda contains 12 teaspoons of sugar, 1/4 teaspoon of orange flavoring and 2 drops of red and yellow coloring. Mix up one batch containing these amounts of the ingredients. Mix up a second batch containing only one half the amount of sugar.
5. Follow-up questions:
   How do the two batches of orange soda taste?
   How might it have tasted if we had used your suggestions for amounts and ingredients?
   What does this demonstration tell you about sugars in food? (Sugar is added to many processed foods.)
   Have the students calculate the total amount of sugar they consume from soft drinks in a usual week.
   How much sugar is this per year?

SUMMARY:

Soft drinks contain large amounts of sugars. Preparation of a drink containing an equivalent amount of sugar illustrates this fact.

Nutrition Curriculum
Unit #7
Function #IX
Activity #6

NAME OF ACTIVITY:	BAKING WITH DIFFERENT SUGAR LEVELS
GENERALIZATION:	Sugars are added to foods during processing, preparation, and at the table.
OBJECTIVES:	Collect observations and record data for recipes with decreased sugar and those with no decrease. Hypothesize what the effect of changing the sugar content of standard recipes will be. Modify menus and recipes to reduce the amount of sugar they contain. Interpret data from the experiment and discuss results and possible errors.
BACKGROUND INFORMATION:	Refer to Unit Outline.
DISCUSSION QUESTIONS:	What substitutions have you attempted in recipes? Were they successful? Have you ever increased or decreased the amounts of specific ingredients? We will keep secret the amount of sweetener added to each group's oatmeal cookies. What would you suppose might happen if, when tasting, we knew the amount of sugar in the different variations? For this experiment it is important to follow directions carefully for measuring, mixing, baking and portioning. Why do you suppose this is important?
EQUIPMENT:	measuring cups and spoons 9" X 13" baking pan bowls mixers or wooden spoons ovens table knives oatmeal cookie recipes

BAKING WITH DIFFERENT SUGAR LEVELS
(continued)

Ingredients:

- oatmeal
- brown sugar
- granulated sugar
- eggs
- vanilla
- flour
- margarine
- baking soda
- salt
- cinnamon
- nutmeg

PROCEDURES:

1. Each group obtains a recipe and uses accurate methods for measuring ingredients, mixing, baking and portioning.
2. Each group codes its plate of cookies and presents correctly portioned products for observation.
3. Follow-up questions:
   Students evaluate cookies using the modified evaluation form. How does reducing the sugar content of the recipe affect the product?
   What is the lowest sugar content that produces an acceptable product?
   What is the reduction in sugar consumption if this reduced sugar recipe is used? (based on a consumption of two cookies per day for a week)

SUMMARY:

The amount of sugar in most recipes can be reduced by 1/3 or more without significant loss of taste or quality.

Nutrition Curriculum
Unit #7
Function #IX
Activity #6

DECREASING SUGAR CONTENT OF OATMEAL COOKIES

ORIGINAL RECIPE - Oatmeal Cookie Squares

1 1/4 cups margarine
3/4 cup firmly packed brown sugar
1/2 cup granulated sugar
1 egg
1 teaspoon vanilla
1 1/2 cups all-purpose flour
1 teaspoon baking soda
1 teaspoon salt
1 teaspoon cinnamon
1/4 teaspoon nutmeg
3 cups oatmeal, quick or old-fashioned, uncooked

Preheat oven to 375 degrees F. Beat together margarine and sugars until light and fluffy. Beat in egg and vanilla. Combine flour, baking soda, salt and spices. Add to margarine mixture, mixing well. Stir in oats. Press dough into bottom of ungreased 13" X 9" pan. Bake 25 minutes or until light golden brown. Cool completely. Cut into 1-1/2 " squares. Store in tightly covered container.

Reduced sugar variations:
1/2 cup brown sugar, 1/4 cup + 3 Tablespoons granulated sugar
1/3 cup brown sugar, 1/3 cup granulated sugar
1/4 cup brown sugar, 1/4 cup granulated sugar

Nutrition Curriculum
Unit #7
Function #IX
Activity #6

MODIFIED RECIPE EVALUATION FORM

PRODUCT: ____

RECIPE MODIFICATIONS: ______________________________________

____

On a scale of 1-10 rate your finished product. (1= POOR; 10=EXCELLENT)

TASTE: ________________ COMMENTS: ______________________

TEXTURE: ______________ COMMENTS: ______________________

TENDERNESS: ___________ COMMENTS: ______________________

COLORING: _____________ COMMENTS: ______________________

APPEARANCE: ___________ COMMENTS: ______________________

OVERALL QUALITY: ______ COMMENTS: ______________________

Is it possible that you made an error that affected the results of the recipe?

__________ What could it have been? _______________________

____

What would you change to make this recipe work better? __________

____

Would you make this product this way again? ________ Why or why not? ____

____

____

____

____

MODIFIED RECIPE EVALUATION FORM (continued)

Evaluation Terms:

Taste The sensation of sweet, sour, salty or bitter qualities produced by a substance placed in the mouth. May be pleasant or unpleasant.

Texture The composition or structure of a substance. How a substance looks or feels.

Coloring Does the product look like it should? (For example - blackness probably indicates burning.) Was there adequate browning?

Appearance How attractive is the product? Is it pleasing to the eye? Would you eat something that looks like this?

Tenderness How easily can this product can be chewed or cut?

Nutrition Curriculum
Unit #7
Function #IX
Activity #6

HOW TO DECREASE YOUR SUGAR CONSUMPTION

IN YOUR KITCHEN: Try decreasing the amount of sugar in recipes you prepare at home. Reduce the level gradually until it has been decreased by 1/3 or more.

Try using spices to create interesting flavors in foods in which sugar has been reduced. Nutmeg, cinnamon, allspice, cloves, ginger and mace add taste and aroma.

Try substituting home-cooked items with less sugar for commercially prepared ones which have higher levels of sugar.

AT THE GROCERY STORE: Plan meals around the Basic Four, and shop with a list to reduce impulse buying and to make sure you have all the ingredients you need.

Include fewer foods on your list that are high in sugar. Decrease purchases of ready-to-eat candy, bakery goods, sweet desserts, soft drinks, and fruit-flavored sweetened beverages.

Identify all added sugars in items by reading ingredient labels. Choose products which are low in total sugar.

WHEN EATING OUT OR AT HOME: Decrease the amount of sugars, syrups, honey, and other sweeteners you add to foods. Get used to half as much in tea or on cereal or fruit. As with baking, a gradual decrease is usually easier to become accustomed to.

Begin substituting fresh fruit for dessert or sweet snacks. Choose fewer foods with high sugar content.

Investigate tradeoffs for the sweetened beverages you drink. Try other selections just to see what they taste like and what they offer you in the area of nutrition.

Target the "3 or more times a week" sweet foods on your checklist and try to choose them less often. You can decrease your intake of sweets by eating or drinking smaller portions. It is not necessary to eliminate totally foods you enjoy once you become aware of how you can decrease sugar content in your diet.

* * * * * *

HOW TO DECREASE YOUR SUGAR CONSUMPTION (continued)

EFFECTS OF CHANGING THE SUGAR CONTENT OF STANDARD RECIPES:

1. Finished product may be less sweet.
2. Sweetness lowers the intensity of a bitter, salty or sour food. For example - lemons + sugar + lemonade.
3. Sugars and syrups add flavor.
4. Sugars and syrups promote browning.
5. Sugars and syrups affect the formation of gluten (substance formed from proteins of wheat flour during dough development).
6. Sugar prohibits coagulation of protein in eggs.
7. Sugar speeds yeast activity. Yeast uses sugar to produce carbon dioxide gas for leavening yeast breads.
8. Sugar makes the texture of a product finer.
9. Greater amounts of sugar increase browning in baked products.
10. Granulated sugar helps incorporate air into mixtures when it is creamed with fat and eggs.

RESOURCES

Human Nutrition Information Service. (1986). *Dietary guidelines for Americans - Avoid too much sugar* (Home and Garden Bulletin No. 232-5). Hyattsville, MD: United States Department of Agriculture.

Human Nutrition Information Service. (1988). *Dietary guidelines and your diet:Home economics teacher's guide* (Miscellaneous Publication No. 1457). Hyattsville, MD: United States Department of Agriculture.

Zeller, P.K., and Jacobson, M.F. (1987). *Eat, drink and be healthy!* Washington, D.C.: Center for Science in the Public Interest.

Nutrition Curriculum
Unit 8

Avoid Too Much Sodium

Nutrition Curriculum Unit Eight

<Dietary Guidelines for Americans ** Avoid Too Much Sodium>

X. Function: Demonstrate knowledge of the functions of sodium in the body and the effects of excess sodium consumption.

GENERALIZATIONS:

1. Sodium is a mineral that occurs naturally in some foods and is added to many foods and beverages.

2. Sodium attracts water into the blood vessels and helps maintain normal blood volume and blood pressure.

3. Sodium is also needed for the normal function of nerves and muscles.

4. One risk factor for high blood pressure may be excess sodium intake.

5. Food labels can help identify high-sodium foods.

6. Careful preparation can help Americans control the sodium content of their diet.

OBJECTIVES:

The student will be able to:

A. Define sodium and salt.

B. List five hidden sources of sodium.

C. List the major functions of sodium in the human body.

D. Describe metabolic changes caused by excessive sodium levels.

E. Identify conditions in the human body that may require a decrease in salt consumption.

F. Evaluate the sodium level of ten foods taken from a preference list.

G. Evaluate low sodium diet from a nutritional point of view.

H. Modify menus and recipes to reduce the sodium content.

I. Experiment with decreased salt in standard recipes.

ADDITIONAL LEARNING ACTIVITIES:

1. Unit: Salt in Your Diet, Nutrition Education Today, pp. 271-286.

ADDITIONAL RESOURCES:

AVOID TOO MUCH SODIUM

I. Relationship between Salt and Sodium.

   A. Table salt is the name we use to refer to sodium chloride.

   B. Salt is 40% sodium and 60% chloride.

II. Major Functions of Sodium in the Body

   A. Regulates water balance in the body (along with chlorine and potassium); consequently, helps to maintain normal blood volume and blood pressure.

   Activity #1 DOES SALT ATTRACT WATER INTO THE BLOOD VESSELS?
   Steps 2 - 9 take about 10 minutes.
   While waiting 10 minutes for Step 10, continue with the following lecture information.

   B. Necessary for the proper functioning of nerves and muscles.

   C. Aids in carbohydrate and protein absorption.

III. Facts About Sodium Consumption

   A. Reasons for Avoiding Too Much Sodium
      1. Can contribute to hypertension (high blood pressure) particularly in individuals with the genetic susceptibility; high blood pressure increases the risk of heart attacks, strokes, and kidney diseases.
      2. Can cause edema (excess retention of water in tissues).
      3. For some individuals, may contribute to migraine headaches.

   B. Amount of Sodium Americans Consume Daily

      Activity #2 WHAT IS YOUR SALT CONSUMPTION?
      Activity #3 SHAKE THE HABIT

   The average American consumer between 2300 mg and 6900 mg sodium daily which can be translated as between 1 1/4 tsp. and 3 1/2 tsp. of salt daily.

   Activity #4 CALCULATE AMOUNT OF SALT CONSUMED IN ONE YEAR

AVOID TOO MUCH SODIUM (continued)

C. Amount of Sodium Americans Need Daily

The amount that is considered safe and adequate is between 1100 mg to 3300 mg sodium daily or between 1/2 tsp. salt to slightly more than 1 1/2 tsp. salt daily.

D. Sources of Sodium
1. Occurs naturally in some foods.
2. Added during preparation at home and in restaurants.
3. Added during commercial food processing.
4. Added at the table.
5. Softened water has more sodium than hard water.
6. Health products, mainly some antacids and laxatives
7. Some of the above sources do have a "salty" flavor. Others, however, do not have an obvious "salty" taste and are called "hidden" sources of sodium. Hidden sources of sodium include
    a. baking powder (leavening).
    b. baking soda (leavening).
    c. monosodium glutamate (flavor enhancer).
    d. seasoned salts.
    e. sodium benzoate (preservative).
    f. sodium is a binder or thickener.
    g. sodium citrate controls acid in fruit drinks and soft drinks.
    h. sodium phosphate (stabilizer).
    i. sodium propionate (stops mold growth).
    j. sodium saccharin (artificial sweetener).
    k. soft water could be a source.

Activity #5 READ THOSE LABELS
Activity #6 EVALUATE SODIUM LEVEL OF 10 FAVORITE FOODS

E. Ways to Reduce Sodium Intake
1. Don't add salt to foods at the table.
2. Decrease amount of salt in recipes.
3. Use herbs and spices for seasonings.
4. Limit the obviously salty foods, like potato chips, salted nuts, condiments, pickled foods, etc.
5. Read labels (the list of ingredients and the nutrition label).
6. Limit use of processed foods and snack foods that generally have a high sodium content.

AVOID TOO MUCH SODIUM (continued)

Activity #7 PREPARE STANDARD RECIPES WITH DECREASED AMOUNTS OF SALT
Activity #7 MODIFY RECIPES WITH SPICE/HERBS SEASONINGS
Activity #8 GROUND BEEF TASTE TEST

IV. Relationship between exercise and sodium loss

A. Sodium lost in sweat during exercising can generally be easily replaced by drinking water and eating balanced meals.

B. Salt tablets contain an excessive amount of sodium which increases the body's need for water and can cause stress to the heart and kidneys.

Nutrition Curriculum
Unit #8
Function #X
Activity #1

NAME OF ACTIVITY: DOES SALT ATTRACT WATER INTO THE BLOOD VESSELS?

GENERALIZATION: Sodium attracts water into the blood vessels and helps maintain normal blood volume and blood pressure. Through osmosis, water passes to and from the blood depending on the concentration of specific minerals.

OBJECTIVES:

List the major functions of sodium in the human body.
Describe the metabolic changes caused by excessive sodium levels.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

What differences did you observe in the three dialysis bags?
What is an assumption that you can make about what caused the differences?
How can this be applied to one of the functions of sodium in our body?
How might an excess sodium intake affect the blood vessels?

EQUIPMENT:

about 18 inches of dialysis tubing (available from science teacher or can be ordered from science supply catalog)
3 beakers or 3 clear glasses
salt
distilled water, if available; if not, tap water

PROCEDURES:

1. Soak tubing in water about 5 minutes so it is easier with which to work. (To save time, do this before class!)
2. Cut dialysis tubing into three equal pieces, each about 6 inches long.
3. Prepare three dialysis bags.
   Twist one end of each piece of tubing and tie a secure knot. The knot should be about the same distance from the end on each of the three bags.

DOES SALT ATTRACT WATER INTO THE BLOOD VESSELS? (continued)

4. Prepare the control.
   Pour 1 t. water into one dialysis bag. Twist the remaining end and tie a secure knot.
5. Prepare weak salt solution.
   (You can make your own proportions, but these work.)
   Combine 1 t. water and 1/8 t. salt. Stir until salt is dissolved. Pour solution into the second dialysis bag, twist remaining end and tie a secure knot.
6. Prepare concentrated salt solution.
   Combine 1 t. water and 1/2 t. salt. Stir until salt is mostly dissolved. Pour solution into the third dialysis bag, twist remaining end and tie a secure knot.
7. If the knots are tied in similar position so the bags are approximately the same size, the turgidity of the three bags should be very similar at this point.
8. Place each bag into a separate beaker/glass of water.
9. Label beaker/glass.
   Dialysis bag #1 - control
   Dialysis bag #2 - weak salt solution
   Dialysis bag #3 - concentrated salt solution
10. In 10 minutes, lift dialysis bags out of the beaker/glass. Note the turgidity of each of the bags by gently squeezing the bag. The difference in the internal pressure of the water in the three bags will be evident. Record the differences between the three.
    (Generally you can make sufficient observation after the first ten minutes; however, you may want to make another observation in a second ten minutes.)

DOES SALT ATTRACT WATER INTO THE BLOOD VESSELS?
(continued)

SUMMARY: Sodium is necessary for the body to function; however, the amount of sodium the body requires is a fraction of what is normally consumed. This excess can adversely affect the body in several ways, as outlined.

Nutrition Curriculum
Unit #8
Function #X
Activity #2

NAME OF ACTIVITY: WHAT IS YOUR SALT CONSUMPTION

GENERALIZATION: Sodium is a mineral that occurs naturally in some foods and is added to many foods and beverages.

OBJECTIVES: List 5 hidden sources of sodium.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS: Explain what the survey tells you about your consumption of salt.
Without totally eliminating a food from your diet, list two things you would be willing to do to modify your diet so your daily salt intake would be reduced.

EQUIPMENT: A copy of the handout "What is your Salt Consumption?" for every student.

PROCEDURES:

1. Distribute the attached survey to students.
2. Ask students to fill out the survey based on their normal eating habits.
3. Evaluate their scores based on the following scale:

If you have more a's circled:
your diet may be very high in sodium
intake If you have more b's circled:
your diet is probably close to the safe
range of 1100 to 3300 mg sodium daily
If you have more c's circled:
you seem to a have a low sodium intake

SUMMARY: Before students are able to decrease sodium consumption, they must become aware of significant sources of sodium in the diet. Most diets can easily be modified so that more acceptable levels of sodium are consumed.

WHAT IS YOUR SALT CONSUMPTION

DIRECTIONS : Circle the letter of the answer that best describes your eating habits.

1. I add salt to food when cooking:
    a. always
    b. sometimes
    c. never

2. I add salt to food at the table before tasting:
    a. always
    b. sometimes
    c. never

3. I eat highly salted foods (pretzels, corn chips, potato chips, nuts, popcorn, etc.):
    a. daily
    b. occasionally
    c. rarely

4. I eat convenience foods (packaged prepared foods, frozen dinners, canned soups, dehydrated seasoning mixes, etc.):
    a. daily
    b. occasionally
    c. rarely

5. I use condiments (catsup, mustard, soy sauce, steak sauce, etc.):
    a. daily
    b. occasionally
    c. rarely

6. I use processed and/or cured foods (bacon, sausage, ham, frankfurters, lunch meats, etc.):
    a. daily
    b. occasionally
    c. rarely

7. I eat at fast food restaurants:
    a. daily
    b. occasionally
    c. rarely

Count the number of a's circled _____
b's circled _____
c's circled _____

(ADAPTED FROM: Nutrition Curriculum Activities Kit, Level 2 and Home & Garden Bulletin No. 232-6.)

Nutrition Curriculum
Unit #8
Function #X
Activity #4

NAME OF ACTIVITY: CALCULATE AMOUNT OF SALT CONSUMED IN 1 YEAR

GENERALIZATION: Sodium is a mineral that occurs naturally in some foods and is added to many foods and beverages.

OBJECTIVES: List 5 hidden sources of sodium.

BACKGROUND INFORMATION: The daily sodium intake for many Americans is estimated between 2300 and 6900 milligrams. Salt is 40% sodium. The typical container of salt weighs 737 grams.

DISCUSSION QUESTIONS: How many containers of salt do you think most Americans consume in one year?

EQUIPMENT: Have 9 containers (737 g) of salt available. Have only one on display.

PROCEDURES:

1. Ask students to guess how many containers of salt the average American consumes per year. Allow them time to respond.
2. Calculate the yearly estimate equivalent of salt. How many containers of salt do most Americans consume in one year?

CALCULATING THE LOWER END OF AMERICAN SODIUM CONSUMPTION:

$$\frac{2300\ \text{mg sodium}}{1\ \text{day}} \times \frac{1\ \text{g sodium}}{1000\ \text{mg sodium}} \times \frac{1\ \text{g salt}}{0.40\ \text{g sodium}} \times \frac{365\ \text{day}}{1\ \text{year}} \times \frac{1\ \text{container}}{737\ \text{g salt}} = \frac{\text{containers}}{\text{year}}$$

$$\frac{2300\ \text{mg sodium}}{1\ \text{day}} \times \frac{1\ \text{g sodium}}{1000\ \text{mg sodium}} \times \frac{1\ \text{g salt}}{0.40\ \text{g sodium}} \times \frac{365\ \text{day}}{1\ \text{year}} \times \frac{1\ \text{container}}{737\ \text{g salt}} = \frac{\text{containers}}{\text{year}}$$

$$\frac{2300 \times 365 \times 1\ \text{container}}{1000 \times 0.40 \times 737 \times 1\ \text{year}} = \underline{\hspace{2cm}}\ \text{containers per year}$$

CALCULATE AMOUNT OF SALT CONSUMED IN 1 YEAR (continued)

CALCULATING THE UPPER END OF AMERICAN SODIUM CONSUMPTION:

$$\frac{6900 \text{ mg sodium}}{1 \text{ day}} \times \frac{1 \text{ g sodium}}{1000 \text{ mg sodium}} \times \frac{1 \text{ g salt}}{0.40 \text{ g sodium}} \times \frac{365 \text{ day}}{1 \text{ year}} \times \frac{1 \text{ container}}{37 \text{ g salt}} = \frac{\text{containers}}{\text{year}}$$

$$\frac{6900 \text{ mg sodium}}{1 \text{ day}} \times \frac{1 \text{ g sodium}}{1000 \text{ mg sodium}} \times \frac{1 \text{ g salt}}{0.40 \text{ g sodium}} \times \frac{365 \text{ day}}{1 \text{ year}} \times \frac{1 \text{ container}}{737 \text{ g salt}} = \frac{\text{containers}}{\text{year}}$$

$$\frac{6900 \times 365 \times \text{container}}{1000 \times 0.40 \times 737 \times \text{year}} = \underline{\hspace{2cm}} \text{ containers per year}$$

SUMMARY: A visual display of 9 containers of salt (This demonstration can also be done in terms of pounds or kilograms of salt, but most students are most familiar with the amount of salt in a container) equivalent to salt contained in selected foods is an effective means of demonstrating salt consumption.

Nutrition Curriculum
Unit #8
Function #X
Activity #5

NAME OF ACTIVITY:	READ THOSE LABELS FOR SODIUM CONTENT
GENERALIZATION:	Food labels can help identify high-sodium foods.
OBJECTIVES:	Evaluate low sodium level of ten foods taken from a preference list.
BACKGROUND INFORMATION:	Refer to Unit Outline.
DISCUSSION QUESTIONS:	Which foods do you expect to have sodium? Were you surprised by which products actually contained sodium? Which form of sodium is most common on the labels you examined?
EQUIPMENT:	In-Class: labels, food products, worksheets Out-of-Class: food products at home and/or in store
PROCEDURES:	1. Distribute handout and worksheet labeled "Read those Labels for Sodium Content". 2. Instruct students on the location of the ingredients listing and the nutrition labeling on standard food labels. 3. Give students the opportunity to do at least one label evaluation in class. The rest of their worksheet can be completed in class or at home.
SUMMARY:	Consumers who are able to identify sources of sodium listed on food labels will be better able to control levels of sodium consumed through wise selection of low sodium foods.

READ THOSE LABELS FOR SODIUM CONTENT

DIRECTIONS: Examine the ingredients list on food labels in your home and look for the following terms which are used to indicate the mineral sodium. List the food product, form of sodium in that product and amount of sodium per serving on the attached worksheet.

salt
soda
sodium
And the symbol: Na (the chemical symbol for sodium)

Examples:

disodium phosphate
*monosodium glutamate
*seasoned salt
sodium alginate
*sodium benzoate
sodium bicarbonate (baking soda)
*sodium caseinate
*sodium citrate
sodium chloride (table salt)
sodium hydroxide
*sodium nitrite
*sodium phosphate
*sodium propionate
*sodium saccharin (Saccharine)
sodium sulfite
AND ALSO
*baking powder
*baking soda

(List compiled from USDA Misc. Publication No. 1457 and Understanding Nutrition. (1987).

*(Reference: USDA Misc. Pub. No. 1457 also lists reasons for using these ingredients)

Nutrition Curriculum
Unit #8
Function #X
Activity #5

READ THOSE LABELS FOR SODIUM CONTENT (Worksheet)

Name of Food Product	Form of Sodium Listed on Label	Amount of Sodium Per Serving on Nutrition Label

Nutrition Curriculum
Unit #8
Function #X
Activity #6

NAME OF ACTIVITY: EVALUATE SODIUM LEVEL OF FAVORITE FOODS

GENERALIZATION: Sodium is a mineral that occurs naturally in some foods and is added to many foods and beverages.

OBJECTIVES: Evaluate the sodium level of ten foods taken from a preference list.
List 5 hidden sources of sodium.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

If you ate these ten foods in one day, what would be the total intake of sodium?

Were you surprised by the amount of sodium in any of the foods on your list?

EQUIPMENT: Two handouts 1) "Selected Common Foods" and 2) "Sodium Content of Selected Foods"

PROCEDURES:

1. Distribute list of selected common foods to students.
2. Have students select ten food items from these lists that they frequently eat.
3. Have students calculate the amount of sodium contained in each food (using the handout "Evaluate the sodium content of favorite foods: Sodium content of selected foods".
4. Have students add up the total sodium content of the ten items.
5. Have students compare the sodium content of the same food in two different forms; for example, fresh and canned; salted or unsalted.
6. Inferring from the comparison done in #5, what generally happens to the sodium content of food when it is processed? Why?

SUMMARY: A primary source of sodium in the diet is found in processed foods. This sodium is often "hidden"; that is, it is a component of many additives and preservatives and may not be recognized by the uninformed consumer who is trying to cut down on salt consumption.

EVALUATE SODIUM LEVEL OF FAVORITE FOODS
<SOME COMMON FOODS>

MILK AND CHEESE

Cheddar Cheese
Cottage Cheese
Monterey
Mozzarella
Parmesan
Swiss
American Pasteurized processed cheese
Milk, whole lowfat
  chocolate
Milk shake
Ice cream
Yogurt

PROTEIN-RICH FOODS

Egg
Salmon, broiled
Salmon, canned
Tuna, canned
Beef, lean
Bacon
Ham
Chicken drumstick
Chicken frankfurter
Beef/pork frankfurter
Bologna
Salami

FRUITS

Apple
Apricots
Bananas
Cantaloupes
Peaches
Pears
Plums

BREADS AND CEREALS

Cheerios
Corn Flakes
Special K
Wheaties
Shredded wheat
Popcorn
  oil and salt
Bread, white
Bread, whole wheat

VEGETABLES

Asparagus, fresh
  canned
Green beans, fresh
  canned
Potato, baked
  instant
  au gratin
Spinach, fresh
  canned
Tomatoes, fresh
  canned
  juice

MISCELLANEOUS ITEMS

Mustard
Peanuts
  dry, roasted, salted
  roasted, salted
  unsalted
Pecans
Pickle, dill
Soy Sauce
Thousand Island dressing
Walnuts

Nutrition Curriculum
Unit #8
Function #X
Activity #6

EVALUATE SODIUM LEVEL OF FAVORITE FOODS
<SPECIFIC FAST FOODS>

- Burger King Whopper
- McDonald's Big Mac
- Wendy's Big Classic
- Arby's Regular Roast Beef
- Burger King Whaler
- McDonald's Filet-O-Fish
- Arby's Chicken Breast Sand.
- Wendy's Chicken Filet Sand.
- Church's Fried Chicken, 2
- Kentucky Fried Chicken, 2
- Kentucky Fried Nuggets
- McDonald's Nuggets
- Burger King Tenders

French Fries
- Arby's
- Burger King
- Church's FC
- Kentucky FC
- McDonald's
- Wendy's

Chocolate Shakes
- Arby's
- Burger King
- McDonald's
- Wendy's Frosty

Nutrition Curriculum
Unit #8
Function #X
Activity #6

EVALUATE SODIUM LEVEL OF FAVORITE FOODS
<SODIUM CONTENT OF SELECTED FOODS>

DIRECTIONS: Use this list of foods to evaluate the sodium content for each of the ten foods you selected.

(Adapted from Home and Garden Bulletin 233 (1980), The Sodium Content of Your Food)

	Serving size	mg sodium
MILK AND CHEESE		
Cheddar Cheese	1 oz	176
Cottage Cheese	4 oz (1/2 cup)	457
Monterey	1 oz	152
Mozzarella	1 oz	132
Parmesan	1 oz	528
Swiss	1 oz	74
American Pasteurized processed cheese	1 oz	406
Milk, whole	1 c	122
lowfat	1 c	122
chocolate	1 c	149
Milk Shake		317
Ice Cream	1 c	75 - 112
Yogurt	8 oz	105 - 174
PROTEIN-RICH FOODS		
Egg	1	59
Salmon, broiled	3 oz	99
Salmon, canned	3 oz	298 - 443
Tuna, canned	3 oz	246 - 384
Beef, lean	3 oz	55
Bacon	2 sl	274
Ham	3 oz	1114
Chicken Drumstick	1	47
Chicken Frankfurter	1	617
Beef/Pork Frankfurter	1	639
Bologna	1 sl	220
Salami	1 sl	255

EVALUATE SODIUM LEVEL OF FAVORITE FOODS
<SODIUM CONTENT OF SELECTED FOODS> (continued)

	Serving size	mg sodium
FRUITS		
Apple	1	1
Apricots	3	1
Banana	1	2
Cantaloupe	1/2	24
Peaches	1	1
Pear	1	1
Plums	1	1
BREADS AND CEREALS		
Bread, white	1 sl	114
whole wheat	1 sl	132
Cheerios	1 1/4 c	304
Corn Flakes	1 1/4 c	320
Special K	1 1/4 c	265
Wheaties	1 1/4 c	443
Shredded Wheat	1 biscuit	3
Popcorn, plain	1 c	3
oil and salt	1 c	175
VEGETABLES		
Asparagus, fresh	4 spears	4
canned	4 spears	298
Green Beans, fresh	1 c	5
canned	1 c	326
Cauliflower, fresh	1 c	17
with cheese sauce	1 c	325
Corn, fresh	1 c	7
canned	1 c	671
Lettuce	1 c	4
Green Peas, fresh	1 c	2
canned	1 c	493
Potato, baked	1	5
instant	1 c	485
au gratin	1 c	1095
Spinach, fresh	1 c	94
canned	1 c	901

EVALUATE SODIUM LEVEL OF FAVORITE FOODS
<SODIUM CONTENT OF SELECTED FOODS> (continued)

	Serving size	mg sodium
VEGETABLES (continued)		
Tomatoes, fresh	1 c	10
canned	1 c	390
juice	1 c	878
catsup	1 T	156
MISCELLANEOUS ITEMS		
Mustard	1 T	195
A-1 Sauce	1 T	275
Soy Sauce	1 T	1029
Thousand Island Dressing		
regular	1 T	109
low cal	1 T	153
Pickle, dill	1	928
Peanuts		
dry, roasted, salted	1 c	986
roasted, salted	1 c	601
unsalted	1 c	8
Pecans	1 c	1
Walnuts	1 c	3

* * * * *

Specific Fast Foods
(Adapted from Consumers Reports, June 1988)

FOOD	mg Sodium
Burger King Whopper	769
McDonald's Big Mac	794
Wendy's Big Classic	739
Arby's Regular Roast Beef	771
Burger King Whaler	542
McDonald's Filet-O-Fish	568

EVALUATE SODIUM LEVEL OF FAVORITE FOODS
<SODIUM CONTENT OF SELECTED FOODS> (continued)

FOOD	mg sodium
Arby's Chicken Breast Sand.	965
Wendy's Chicken Filet Sand.	878
Church's Fried Chicken, 2	726
Kentucky Fried Chicken, 2	619
Kentucky Fried Nuggets	634
McDonald's Nuggets	443
Burger King Tenders	519
French Fries	
Arby's	60
Burger King	127
Church's FC	87
Kentucky FC	86
McDonald's	121
Wendy's	108
Chocolate Shakes	
Arby's	294
Burger King	514
McDonald's	278
Wendy's Frosty	257

Nutrition Curriculum
Unit #8
Function #X
Activity #7

NAME OF ACTIVITY: PREPARE STANDARD RECIPES WITH DECREASED AMOUNTS OF SALT

GENERALIZATION: Careful preparation can help Americans control the sodium content of their diet.

OBJECTIVES:

Modify menus and recipes to reduce the sodium content.
Experiment with decreased salt in standard recipes.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

How does changing the salt content of a standard recipe affect the product?
Describe the flavor of each of the bread products.
Indicate whether the product is acceptable or unacceptable, and give reasons.
If you were trying to reduce the amount of sodium in your daily diet, would you consider using muffin, cornbread, and biscuit recipes with reduced salt? Why or why not?

EQUIPMENT:

Recipe handouts (# 1,3 & 5 are standard recipes; # 2,4 & 6 are the reduced salt recipes)
ingredients for making the products
standard kitchen equipment for preparing the products

PROCEDURES:

1. Distribute one recipe to each kitchen.
2. Each kitchen prepares the product.
3. Each kitchen calculates the amount of sodium per recipe and per serving. Use:
   1 t. = 2000 mg sodium
   3/4 t. = 1500 mg sodium
   1/2 t. = 1000 mg sodium
   1/4 t. = 500 mg sodium
   1/8 t. = 250 mg sodium
4. Each student samples and evaluates food from each of the six kitchens.

SUMMARY: Sodium content of recipes can be carefully regulated without affecting product quality.

Nutrition Curriculum
Unit #8
Function #X
Activity #7

PREPARE STANDARD RECIPES WITH DECREASED AMOUNTS OF SALT <RECIPES>

MUFFINS

Recipe # 1

2	cups	flour	1	egg,	beaten
1/4	cup	sugar	1/4	cup	oil
1/2	t.	salt	1	cup	milk
2 1/2	t.	baking powder			

1. Preheat oven to 400 degrees F.
2. Lightly grease muffin pan with solid shortening.
3. Sift dry ingredients together into a large mixing bowl.
4. In a separate bowl, beat the egg.
   Add the oil and milk to the egg.
5. Make a well in the center of the dry ingredients.
   Add liquid ingredients all at once; stir just until mixed.
   (Batter will still be lumpy.)
6. Fill greased muffin cups 2/3 full.
   Bake for 20 - 25 minutes.

Recipe # 2

2	cups	flour	1	egg,	beaten
1/4	cup	sugar	1/4	cup	oil
1/4	t.	salt	1	cup	milk
2 1/2	t.	baking powder			

1. Preheat oven to 400 degrees F.
2. Lightly grease muffin pan with solid shortening.
3. Sift dry ingredients together into a large mixing bowl.
4. In a separate bowl, beat the egg.
   Add the oil and milk to the egg.
5. Make a well in the center of the dry ingredients.
   Add liquid ingredients all at once; stir just until mixed.
   (Batter will still be lumpy.)
6. Fill greased muffin cups 2/3 full.
   Bake for 20 - 25 minutes.

Nutrition Curriculum
Unit #8
Function #X
Activity #7

PREPARE STANDARD RECIPES WITH DECREASED AMOUNTS OF SALT
<RECIPES>

CORN BREAD or CORNMEAL MUFFINS

Recipe # 3

1 cup flour
1 cup corn meal
4 t. baking powder
3/4 t. salt
1/4 cup sugar

2 eggs, beaten
1 cup milk
1/4 cup oil

1. Preheat oven to 425 degrees F. Grease square or round pan or muffin pan.
2. Sift flour with cornmeal, baking powder, salt, and sugar.
3. Combine eggs, milk, and oil.
4. Make a well in the center of the dry ingredients. Add liquid ingredients all at once, stir until moistened.
5. Pour into greased pan or muffin pan.
6. Bake for 20 - 25 minutes.

Recipe # 4

1 cup flour
1 cup corn meal
4 t. baking powder
1/4 t. salt
1/4 cup sugar

2 eggs, beaten
1 cup milk
1/4 cup oil

1. Preheat oven to 425 degrees F. Grease square or round pan or muffin pan.
2. Sift flour with cornmeal, baking powder, salt, and sugar.
3. Combine eggs, milk, and oil.
4. Make a well in the center of the dry ingredients. Add liquid ingredients all at once, stir until moistened.
5. Pour into greased pan or muffin pan.
6. Bake for 20 - 25 minutes.

Nutrition Curriculum
Unit #8
Function #X
Activity #7

PREPARE STANDARD RECIPES WITH DECREASED AMOUNTS OF SALT
<RECIPES>

BISCUITS

Recipe # 5

1	cup	flour
1 1/2	t.	baking powder
1/4	t.	salt
2	T.	shortening
1/4	cup + 2 T.	milk

1. Preheat oven to 450 degrees F.
2. Sift flour with baking powder and salt into mixing bowl.
3. Cut in shortening with pastry blender until mixture resembles fine crumbs. .
4. Stir in just enough milk so dough leaves side of bowl and rounds up in a ball (too much milk makes dough sticky, not enough milk makes biscuits dry).
5. Place dough onto lightly floured surface. Knead lightly 10 times (too much handling makes biscuits tough).
6. Roll 1/2 inch thick. Cut with floured cutter.
7. Place on UNGREASED cookie sheet: about 1 inch apart for crusty sides or touching for soft sides.
8. Bake until golden brown, 10 - 12 minutes.
9. Immediately remove from cookie sheet.

Recipe # 6

1	cup	flour
1 1/2	t.	baking powder
1/8	t.	salt
2	T.	shortening
1/4	cup + 2 T.	milk

1. Preheat oven to 450 degrees F.
2. Sift flour with baking powder and salt into mixing bowl.
3. Cut in shortening with pastry blender until mixture resembles fine crumbs.
4. Stir in just enough milk so dough leaves side of bowl and rounds up in a ball (too much milk makes dough sticky, not enough milk makes biscuits dry).
5. Place dough onto lightly floured surface. Knead lightly 10 times (too much handling makes biscuits tough).
6. Roll 1/2 inch thick. Cut with floured cutter.
7. Place on UNGREASED cookie sheet: about 1 inch apart for crusty sides or touching for soft sides.
8. Bake until golden brown, 10 - 12 minutes.
9. Immediately remove from cookie sheet.

PREPARE STANDARD RECIPES WITH DECREASED AMOUNTS OF SALT

An alternative activity can be designed in which recipes can be modified by substituting spices and herbs as seasonings instead of using salt or in addition to reducing the amount of salt.

Use chart, "Spicing It Up Without the Salt Shaker", on page 6 of USDA, Home and Garden Bulletin 232-6.

Nutrition Curriculum
Unit #8
Function #X
Activity #8

NAME OF ACTIVITY: GROUND BEEF TASTE TEST

GENERALIZATION: Careful preparation can help Americans control the sodium content of their diet.

OBJECTIVES: Evaluate low sodium diet preparation methods in terms of palatability.

BACKGROUND INFORMATION: Refer to Unit Outline. The taste for salt is learned; it can be unlearned.

DISCUSSION QUESTIONS:

Does everyone have the same taste for salt?
Could the fact that your health is involved make you learn to live with less salt?
Which preparation of beef did you prefer?
How would you prepare beef to decrease sodium content?

EQUIPMENT: Ground beef, salt, Celestial Seasonings Rancher's Pride Herb & Spice Blend for Beef, lemon juice, broiler pan, broiler

PROCEDURES:

1. Prepare small portions of ground beef using 1/4 t. salt per 1/4 lb, 1/8 t. salt per 1/4 lb, no salt or other flavorings in one portion, 1 1/2 t. commercial no salt seasoning such as Rancher's Pride mentioned above per 1/4 lb (not a salt substitute), any other desired combination of herbs or spices with or without lowered salt amounts.
2. Broil until barely done.
   Be sure to proceed in such a way that the beef patties can be correctly matched to the ingredients.
3. Have students taste test and grade as acceptable or unacceptable and comment.
4. Have them try lemon juice on a bite that doesn't seem salty and grade it.

SUMMARY: The taste for salt is acquired. Using alternate preparation methods can eliminate the use of some sodium in cooking.

RESOURCES

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RESOURCES (continued)

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Whitney, E.N. & Hamilton, E.M.N. (1987). Understanding nutrition (4th ed.). St. Paul: West Publishing Co.

NOTE TO TEACHERS:

Please make the following change in one of the references.

USDA Misc. Publication, No. 1457, Dietary Guidelines and Your Diet - Home Economics Teacher's Guide (February 1988) has NOTES TO YOU section on page 29. The following information needs to be updated in the USDA Home and Garden Bulletin No. 232-6. Dietary Guidelines for Americans, Avoid Too Much Sodium. (April 1986). On page 5, paragraph 2, second sentence should read: "Placing sodium content on the nutrition label is now mandatory." And on page 8, the Answer to Quiz question #1 should read: "True. Sodium is mandatory on nutrition labels."

Nutrition Curriculum
Unit 9

If You Drink Alcohol, Do So In Moderation

Nutrition Curriculum Unit Nine

<Dietary Guidelines for Americans ** If You Drink Alcohol, Do So In Moderation>

XI. Function: Identify effects of alcohol on the human body and reasons for its limited use.

GENERALIZATIONS:

1. Alcoholic beverages are high in calories, but low in nutrients.

2. Heavy drinkers may develop nutritional deficiencies and more serious diseases, such as cirrhosis of the liver and certain types of cancer.

3. Social pressures contribute to the prevalence of alcohol abuse among teenagers.

OBJECTIVES:

The student will be able to:

A. Define alcohol.

B. Define proof in relation to alcohol content.

C. Explain how the human body utilizes alcohol for energy.

D. Explain how alcohol use affects total nutrition.

E. Describe one disease related to excess alcohol consumption.

F. Determine alternate non-alcoholic beverages for consumption at social functions.

ADDITIONAL LEARNING ACTIVITIES:

1. Unit: Fetal Alcohol Syndrome, Nutrition Education Today, pp. 371-379.

ADDITIONAL RESOURCES:

Hamilton, E.M., Whitney, E.N. & Sizer, F.S. (1988). Nutrition: concepts and controversies (4th ed.). St. Paul: West Publishing Company. pp. 498-500.

ALCOHOL AND THE BODY

I. Alcohol and the Effects on the Body

- A. Alcohol
    - 1. Definition
    - 2. Meaning of "proof"
    - 3. Comparison of beer, wine and whiskey
    - 4. Calories and nutritive value

- B. Metabolism of Alcohol
    - 1. Stomach
        - a. With food
        - b. Without food
    - 2. Liver
    - 3. The blood alcohol level (BAL)

- C. Affects of Heavy Use on Body Systems
    - 1. Liver
        - a. Fatty liver
        - b. Fibrosis
        - c. Cirrhosis
    - 2. Brain
        - a. Reasoning judgment
        - b. Vision and speech
        - c. Large muscles coordination
        - d. Passout - breathing and heartbeat
        - e. No regeneration of cells
    - 3. Other
        - a. Eye
        - b. Kidney

- D. Benefits to the body in moderation
    - 1. Relaxation
    - 2. Assists in health
        - a. Cholesterol
        - b. Blood pressure
        - c. Heart
    - 3. Wine assists appetite

- E. Myths about sobering up
    - 1. Coffee
    - 2. Exercise

- F. Prescription drugs and alcohol
    - 1. Problems when drinking
    - 2. Problems when stopped for drugs

ALCOHOL AND THE BODY (continued)

G. Deficiencies caused by heavy alcohol consumption
   1. Vitamins
      a. Thiamin
      b. Niacin
      c. B-12
      d. Folacin
   2. Minerals
      a. Magnesium
      b. Zinc
      c. Potassium
   3. Protein

H. Deterioration of body systems with extended abuse

I. Diseases and illnesses
   1. Liver
      a. Hepatitis
      b. Cirrhosis
   2. Other
      a. Wernicke-Korsakoff
      b. Gout
      c. Edema
      d. Ulcer

II. Theories About Heredity and Alcoholism

A. Goodwin Study
   1. Children of alcoholic and non-alcoholic parents
   2. Sons of alcoholic parents and adopted sons living in non-alcoholic families

B. Abnormal mitochondria in liver

III. General Information about the Alcoholic

Nutrition Curriculum
Unit #9
Function #XI
PRE TEST

NAME ______________________________ PERIOD _______

WHAT DO YOU KNOW ABOUT ALCOHOL?

Directions: Read the statement and then circle the appropriate letter. T is for true and F is for false. Answer # 15. in full.

T F 1. Many teenagers drink because of peer pressure.

T F 2. A bottle of beer (12 oz.) contains the same amount of alcohol as a mixed drink with one ounce of scotch.

T F 3. Alcohol is high in calories, but has little nutritional value.

T F 4. Moderate use of alcohol is not harmful to the body.

T F 5. Walking around the block or drinking black coffee will sober up someone who is drunk.

T F 6. Alcoholism is hereditary.

T F 7. There is not sufficient alcohol content in beer to allow a person to become drunk.

T F 8. Too much alcohol in the system can cause a person to be malnourished even though he or she may be eating a balanced diet.

T F 9. There are about nine million people in the United States who abuse alcohol.

T F 10. In the brain, the first function to be affected by alcohol is the muscular control.

T F 11. According to statistics many teenagers become alcoholics before they graduate from high school.

T F 12. Television has a large influence on young people's drinking habits.

T F 13. Prescription drugs do not work as they were intended if the person is consuming alcohol at the same time.

T F 14. Alcohol consumed in small quantities is good for the body.

15. List four reasons why young people drink:

What Do You Know About Alcohol? <Answer Sheet>

1. T
2. T
3. T
4. T
5. F
6. T (according to current literature)
7. F
8. T
9. T
10. F
11. T
12. T
13. T
14. T
15. A variety of answers could be correct. Refer to handout entitled, "Teen-age Drinking - An Epidemic", for possible answers.

Nutrition Curriculum
Unit #9
Function #XI
Activity #1

NAME OF ACTIVITY:	THE ALCOHOLIC - WELL FED BUT MALNOURISHED (worksheet on nutrient deficiencies)
GENERALIZATION:	Heavy drinkers may develop nutritional deficiencies and more serious diseases such as cirrhosis of the liver.
OBJECTIVES:	Explain how the human body utilizes alcohol for energy. Explain how alcohol use affects total nutrition.
BACKGROUND INFORMATION:	Refer to handouts and references.
DISCUSSION QUESTIONS:	What is the meaning of the term "deficiency"? What are the positive effects of nutrients?
EQUIPMENT:	textbook reference book notes worksheet on The Alcoholic - Well Fed, but Malnourished
PROCEDURES:	1. Give out worksheet and go over instructions. Make sure students understand what books to use. 2. Students are to hand in worksheet when completed.
SUMMARY:	Stress importance of a well-balanced diet and the dangers involved in neglect or abuse of our bodies.

Nutrition Curriculum
Unit #9
Function #XI
Activity #1

THE ALCOHOLIC - WELL FED BUT MALNOURISHED

Below are listed the nutrients that could be missing in the body of a person who consumes large amounts of alcohol because the body is using these nutrients less efficiently. Look up the information in column A & B for each nutrient that is listed.

	What nutrient does for body	Problems that arise when deficiency occurs
THIAMINE		
NIACIN		
B12		
FOLACIN		
PROTEIN		
MAGNESIUM		
POTASSIUM		
ZINC		

BODY DISORDERS
ASSOCIATED WITH EXCESS ALCOHOL

GOUT: Alcohol interferes with excretion of uric acid and causes accumulation of uric acid crystals in joints, resulting in destruction and deformity of the bone.

EDEMA: Swelling because of fluid accumulation in the abdomen (sometimes called a "beer belly"); also may cause puffy hands, feet and face.

WERNICKE'S DISEASE: Paralysis of eye muscles, involuntary movement of eyeballs, or failure of muscular coordination due to thiamin deficiency associated with alcoholism.

KORSAKOFF SYNDROME: Memory defect, mental confusion, and damage to nervous system associated with excessive alcohol consumption.

LIVER: breaks down in stages as follows:

Fatty liver: Alcohol interferes with nutrients and oxygen distribution of liver cells; fat accumulates in liver cells, and cells eventually die.

Fibrosis: Intermediate stage of liver deterioration is reversible with good nutrition. Scar tissue develops, liver cells lose their function and act like connective tissue.

Alcoholic Hepatitis: Inflammation of liver results in pain and jaundice. Obstruction of blood flow results in cell death. Treatment - good nutrition and abstinence.

Cirrhosis: Advanced liver disease; liver cells die, harden and turn orange. This stage is irreversible.

General symptoms indicating that nutritional deficiencies may be occurring:

1. Reduction of appetite
2. Fatigue
3. Weight loss
4. Lack of resistance to infection
5. Digestive problems such as nausea, vomiting, and indigestion
6. Vision problems

Nutrition Curriculum
Unit #9
Function #XI
Activity #2

NAME OF ACTIVITY: "WHAT TEENS SHOULD KNOW ABOUT ALCOHOL"

GENERALIZATION: Social pressures contribute to the prevalence of alcohol abuse among teenagers.

OBJECTIVES:

Define alcohol.
Describe one disease related to excess alcohol consumption.
Students will review information concerning alcohol and its effects on the body. They will gain information on reasons teenagers drink, problems that accompany drinking, and facts and figures about alcohol.

BACKGROUND INFORMATION:

See filmstrip questionnaire and references.
Filmstrip from:

Pleasantville Media
Suite W
P.O. Box 415
Pleasantville, N.Y. 10570

Call for price: 800-431-2434

DISCUSSION QUESTIONS:

What are some of the problems that accompany drinking?
What are some ways to turn down an invitation to a drinking party?
What could you do if you suspected that a friend had a drinking problem?
What are some of the benefits of going to the support groups - AA, Al-Anon, and Alateen?

EQUIPMENT:

filmstrip/projector
pencil/pen/paper
information sheet about filmstrip
handout "Teen-age Drinking - An Epidemic"

PROCEDURES:

1. Make opening statements concerning the filmstrip and read the sheet they will fill out afterwards.
2. View the filmstrip.
3. Hand out the questionnaire about the filmstrip.
4. Exchange papers and review answers.
5. Ask questions listed under discussion questions.

"WHAT TEENS SHOULD KNOW ABOUT ALCOHOL" (continued)

SUMMARY: Alcohol can be a health risk. There is much peer pressure to drink; however, drinking is not necessary to belong to a group and to have a good time. For the alcoholic or heavy drinker and for the families, there are several groups that are available to give assistance.

Nutrition Curriculum
Unit #9
Function #XI
Activity #2

TEEN-AGE DRINKING - AN EPIDEMIC

The reasons teenagers drink include:

- Alcohol is legal.
- It's socially acceptable.
- Parents do it.
- There is easy access.
- Parents would rather have children drink than smoke marijuana.

There is a big push to educate about AIDS; and therefore alcohol education is neglected. Some figures about teens and drinks are:

- 1 in 6 is addicted.
- 93% have tried it.
- 10,000 young people are killed in alcohol related incidents per year.

Children as young as 10 and 12 are drinking. Drinking patterns include:

- Having parties to drink.
- Downing many drinks in a short period of time.
- Drinking to get drunk.

Why teens drink:

- Peer pressure
- Social thing to do
- Desire to experience new things
- To take a risk
- Avoid dealing with everyday problems
- To cope with shyness
- To reduce pain
- To relax

T.V. is a big influence:

There are 75,000 drinking scenes viewed before teens are of legal age. T.V. portrays drinking to socialize and drinking to cope with personal crises.

Pattern among teens who will drink regularly (peak vulnerability age 14 to 15) :

- Turn down first drink.
- Decide to experiment.
- Begin to drink regularly.
- Become dependent on alcohol.

Nutrition Curriculum
Unit #9
Function #XI
Activity #2

NAME____ PERIOD______________

FILM: "WHAT TEENS SHOULD KNOW ABOUT ALCOHOL"

Directions: Fill in the blank or choose the correct answer.

1. Alcohol is a psychoactive drug, which means it goes directly to the ______________ and affects the central nervous system.

2. Alcohol is popular because it is:
   a.
   b.
   c.

3. It has recently been estimated that _______% of 10-12th graders have tried alcohol.

4. Almost ______% are moderate to heavy drinkers who have _______ to _______ drinks at one time each week.

5. Nearly ____% are heavy drinkers who consume at least _______ drinks at one time at least once a week.

6. The reasons that teenagers drink are/are not very different from the reasons that adults drink.

7. The percentage of alcohol determines the "__________________" (90 proof is ______% alcohol).

8. T or F: You can get just as drunk from 3 beers as from 3 shots of whiskey or 3 glasses of wine.

9. It takes about ______ to ______ hours for each drink to leave your system.

10. Alcohol is a ________________, that eventually slows down all your body functions.

11. The best way to deal with a hangover is ___________________.

12. One study found that _____ out of _____ teenage girls who are pregnant had been drinking prior to intercourse.

13. It is dangerous to mix alcohol with other drugs because they _______________ each other's effects.

14. About _______ of fatal car and fatal motorcycle accidents involve alcohol.

FILM: "WHAT TEENS SHOULD KNOW ABOUT ALCOHOL"

15. Guidelines for safer drinking are:

    a.

    b.

    c.

    d.

    e.

    f.

16. Questions to ask yourself to check if you are a problem drinker are:

    a.

    b.

    c.

    d.

    e.

    f.

    g.

    h.

    i.

17. What groups are served by these organizations?

    a. Alcoholics Anonymous

    b. Al-Anon

    c. Alateen

Nutrition Curriculum
Unit #9
Function #XI
Activity #2

FILM: "WHAT TEENS SHOULD KNOW ABOUT ALCOHOL" <Answer Sheet>

1. Alcohol is a psychoactive drug, which means it goes directly to the BRAIN and affects the central nervous system.

2. Alcohol is popular because it is:
   a. LEGAL
   b. EASY TO OBTAIN
   c. INEXPENSIVE ALSO: HAVE APPROVAL OF SOCIETY

3. It has recently been estimated that 87 % of 10-12th graders have tried alcohol.

4. Almost 34 % are moderate to heavy drinkers who have 2 to 4 drinks at one time each week.

5. Nearly 15 % are heavy drinkers who consume at least 5 drinks at one time at least once a week.

6. The reasons that teenagers drink are/are not very different from the reasons that adults drink.

7. The percentage of alcohol determines the "PROOF" (90 proof is 45 % alcohol

8. T or F: You can get just as drunk from 3 beers as from 3 shots of whiskey or 3 glasses of wine.

9. It takes about 1 to 2 hours for each drink to leave your system.

10. Alcohol is a DEPRESSANT that eventually slows down all your body functions.

11. The best way to deal with a hangover is NOT GET ONE.

12. One study found that 4 out of 5 teenage girls who are pregnant had been drinking prior to intercourse.

13. It is dangerous to mix alcohol with other drugs because they MULTIPLY each other's effects.

14. About 1/2 of fatal car and fatal motorcycle accidents involve alcohol.

FILM: "WHAT TEENS SHOULD KNOW ABOUT ALCOHOL" <Answer Sheet>

15. Guidelines for safer drinking:

    a. SIP SLOWLY

    b. DON'T DRINK FASTER THAN THE BODY CAN BURN ALCOHOL

    c. EAT

    d. DON'T DRINK WHEN SICK, TIRED, OR ANGRY

    e. BEWARE OF UNFAMILIAR DRINKS

    f. IF YOU DON'T WANT A DRINK, REFUSE IT

16. Questions to ask yourself to check if you are a problem drinker are:

    a. DO YOU DRINK BECAUSE YOU HAVE PROBLEMS?

    b. DO YOU EVER DRINK ALONE?

    c. DOES YOUR DRINKING CAUSE PROBLEMS WITH FRIENDS, PARENTS, SCHOOL OR POLICE?

    d. DO YOU EVER TRY TO DRINK LESS AND FAIL?

    e. DO YOU GULP YOUR DRINKS AS IF THIRSTY?

    f. DO YOU BECOME UNHAPPY WHEN ALCOHOL IS NOT SERVED?

    g. DO YOU EVER HAVE LOSS OF MEMORY BECAUSE OF DRINK?

    h. DO YOU OFTEN GET DRUNK?

    i. ARE YOU PROUD THAT YOU CAN HOLD YOUR LIQUOR?

18. What groups are served by these organizations?

    a. Alcoholics Anonymous- FOR THE RECOVERING ALCOHOLIC

    b. Al-Anon- FOR FAMILY MEMBERS, FRIENDS, AND ASSOCIATES OF THE ALCOHOLIC.

    c. Alateen- FOR TEENS WHO HAVE ALCOHOLIC PARENTS

Nutrition Curriculum
Unit #9
Function #XI
Activity #3

NAME OF ACTIVITY:	"CREATE A DRINK"
GENERALIZATION:	Alcoholic beverages are high in calories, but low in nutrients.
OBJECTIVES:	Determine alternate non-alcoholic beverages for consumption at social functions.
BACKGROUND INFORMATION:	Review the facts learned about alcoholic beverages and their negative effects on the body. The purpose of this assignment is for teenagers to create an appealing, nonalcoholic drink. The teacher will provide several examples from recipe books as a stimulus for creativity. This can be used as a contest among lab groups. On lab day another class or a panel of judges will judge drinks according to appearance, taste and appeal to teenagers. The winning group will have their names and the recipe they created in the school newspaper.
DISCUSSION QUESTIONS:	Is your drink appealing in appearance and taste? If not, how could you improve it? What are the advantages of using non-alcoholic beverages for your party?
EQUIPMENT:	Cook books, lab sheets, other lab equipment and ingredients necessary to make product.
PROCEDURES:	1. Divide class into group. 2. Each group will look through recipe books for ideas and then create their own non-alcoholic beverage recipe. 3. The lab sheet will then be filled out listing duties, times, and needed ingredients. 4. When all plans have been completed, student will look up the nutritional value of their particular drink so that they can tell the class and the judges how it will be better than an alcoholic beverage. 5. The next day students will make their drinks and have them judged.
SUMMARY:	A beverage does not have to be alcoholic to be fun and good tasting.

Nutrition Curriculum
Unit #9
Function #XI
Activity #4

NAME OF ACTIVITY: "GET SOMEONE'S ATTENTION"

GENERALIZATION: Heavy drinkers may develop nutritional deficiencies and more serious diseases, such as cirrhosis of the liver and certain types of cancer.

OBJECTIVES: Explain how the human body utilizes alcohol for energy.
Explain how alcohol use affects total nutrition.

BACKGROUND INFORMATION: Use all information presented previously, such as book, notes, handouts, filmstrip, etc. Students will make a visual aid such as a handout, poster or bulletin board.

Students may choose one of the following titles as a theme:

1. Alcoholism, a Disease
2. Facts and Figures about Alcohol
3. Peer Pressure to Drink
4. Drinking and Driving
5. Support Groups for the Alcoholic and their Families
6. How Our Bodies Use Alcohol
7. Myths and Realities About Alcohol

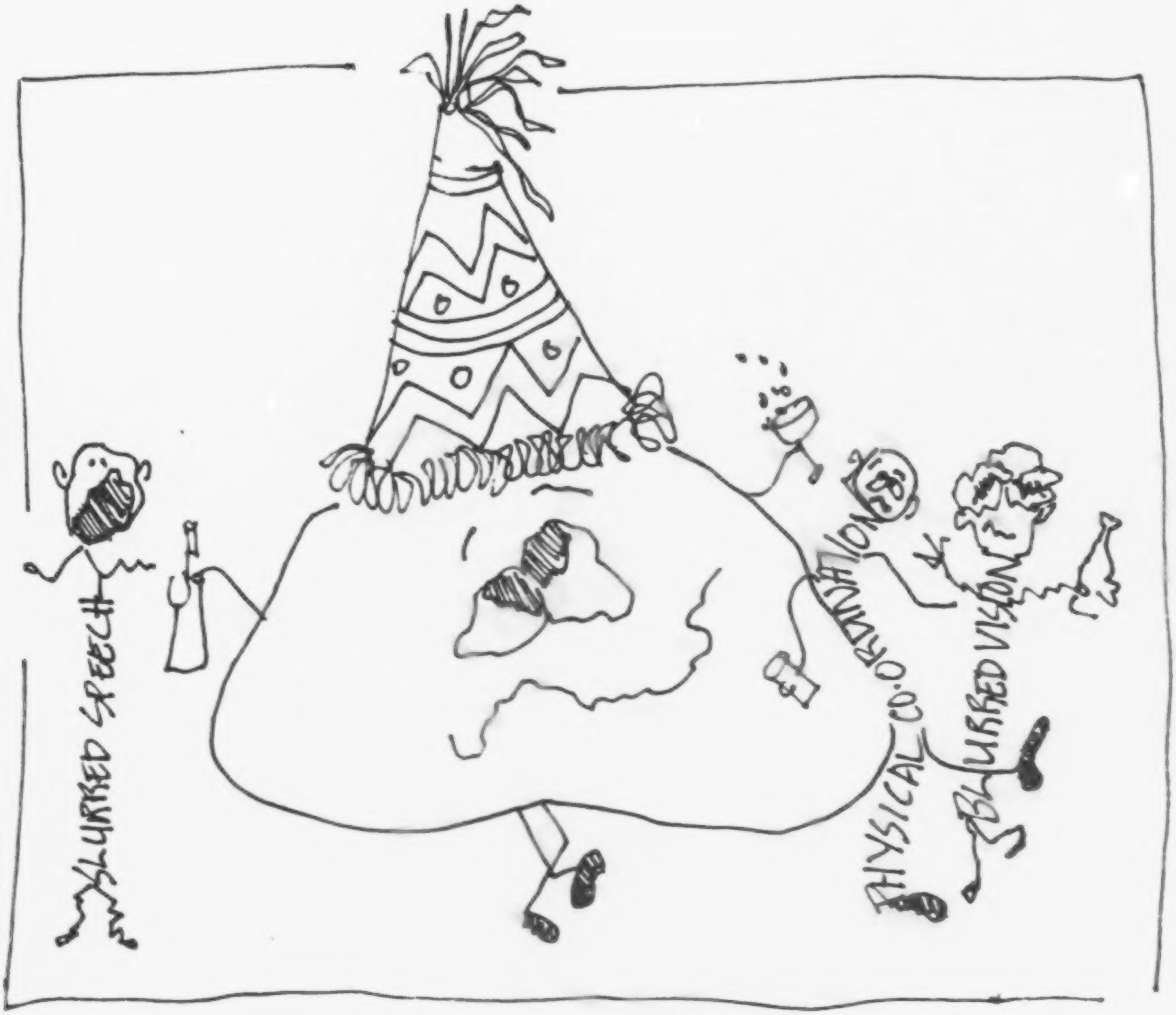
EQUIPMENT: Paper, scissors, glue, magazines, poster board and other supportive material.

PROCEDURES:

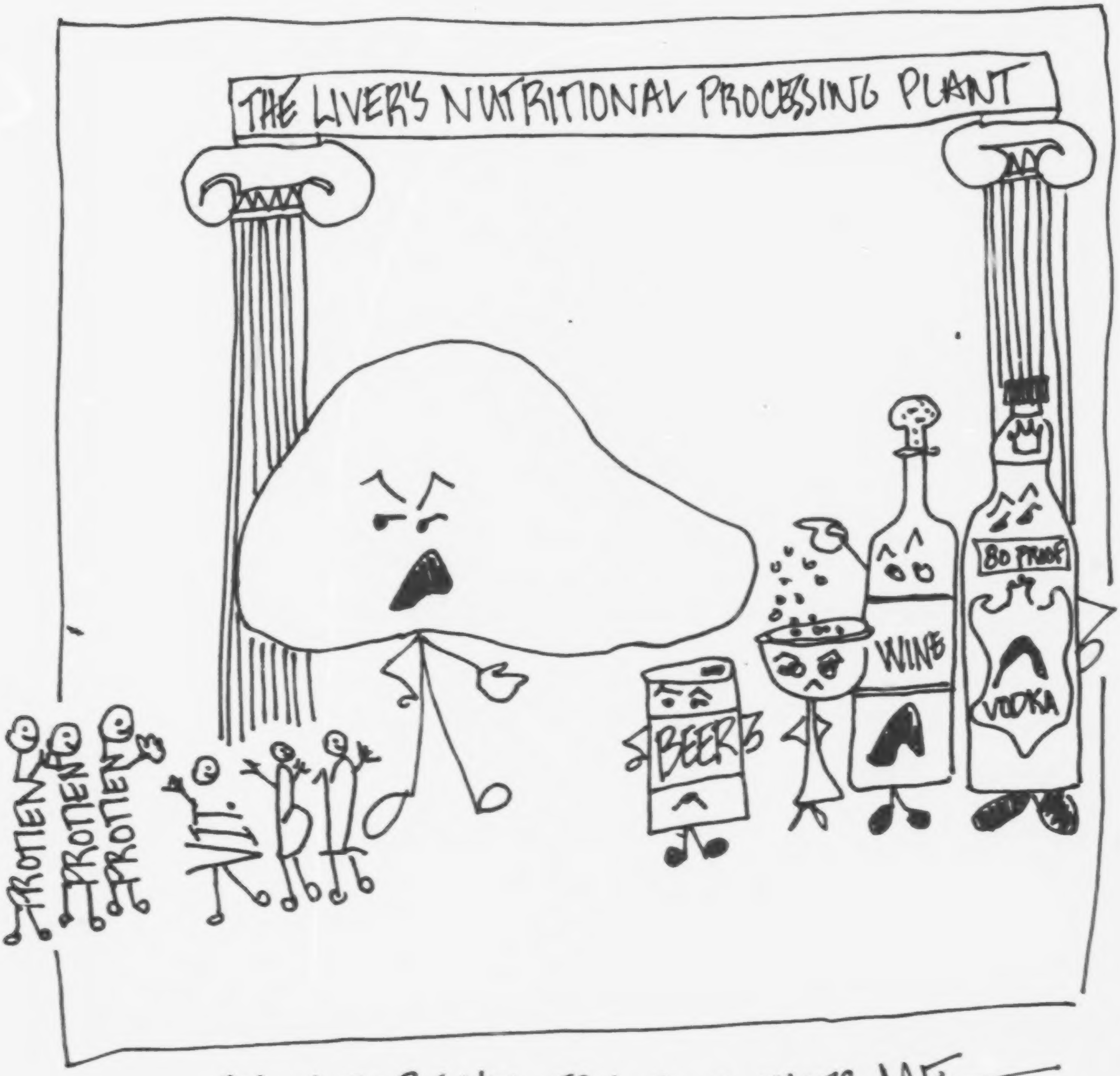
1. Divide into groups.
2. Each group will select a different title and produce a visual aid using the supplies that are available in the classroom.
3. Students will make suggestions as to how their visual aid could be used best.

SUMMARY: This is a means of applying the information gained during this unit and sharing it with others.

UNIT HANDOUTS AND OVERHEADS


SLURRED SPEECH
PHYSICAL CO-ORDINATION
&
BLURRED VISION

" MY FRIENDS AND I ARE THE LIFE OF THE PARTY....."


THE LIVER'S NUTRITIONAL PROCESSING PLANT
PROTIEN
PROTIEN
PROTIEN
VIT.
BEER
WINE
80 PROOF
VODKA

"HOW DARE YOU TRY TO BOTHER ME—
I'M BUSY WITH THE V.I.P'S!"

RESOURCES

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Nutrition Curriculum Unit Nine

<Dietary Guidelines for Americans ** If You Drink Alcohol, Do So In Moderation>

XII. Function: Alcohol can have particularly detrimental effects on fetal development.

GENERALIZATIONS:	**OBJECTIVES:**	**ADDITIONAL LEARNING ACTIVITIES:**	**ADDITIONAL RESOURCES:**
1. Drinking alcoholic beverages during pregnancy may damage the developing fetus.	A. Explain the possible effect on the unborn child of excessive alcohol consumption during pregnancy. B. Analyze the risks regarding the use of alcohol during the child bearing years.	1. Unit: Fetal Alcohol Syndrome, Nutrition Education Today, pp. 371-379.	Hamilton, E.M., Whitney, E.N. & Sizer, F.S. (1988). Nutrition: concepts and controversies (4th ed.). St. Paul: West Publishing Company. pp. 498-500.

NUTRITION DURING PREGNANCY

I. The Importance of Good Nutrition During Pregnancy

   A. Nutrient needs during pregnancy increase due to:
      1. Enlarging uterus
      2. Building and maintaining the changing placenta
      3. Building a complete blood supply for the baby outside the womb
      4. Maintaining a protective membrane to surround the growing baby

   B. Alcohol sometimes replaces nutrient-rich foods during pregnancy.

   C. There are increased birth risks due to insufficient nutrient intake:
      1. Premature
      2. Stillborn
      3. Low birth weight

II. Teenage mothers are at greater risk due to these:

   A. Physical growth of the mother is incomplete.

   B. Poor eating habits

   C. Inadequate medical care and nutritional counseling

III. Dietary Recommendations for the Pregnant Woman based on the Food Group Plan

   A. Dietary recommendations from fruits and vegetables group
      1. One source vitamin A-rich food daily
      2. One source vitamin C-rich food daily
      3. Two additional servings daily

NUTRITION DURING PREGNANCY (continued)

- B. Dietary recommendations from bread and cereals group
    - 1. Four servings daily
    - 2. The benefits of whole-grain products
- C. Dietary recommendations from protein group
    - 1. Four servings daily
    - 2. Alternatives for beef, chicken, pork, and fish
- D. Dietary recommendations from milk and cheese group
    - 1. Four to five servings of whole milk daily
    - 2. Alternatives to milk
- E. Dietary adjustments for pregnant teenagers

IV. General Dietary Guidelines for the Pregnant Woman

- A. Appropriate weight gain
- B. Four to five small meals vs. three large meals daily
- C. Use of nutrient supplements
- D. The danger of weight loss dieting during pregnancy
- E. Six to eight glasses of water daily
- F. How to deal with morning sickness
- G. Cravings
- H. Healthful snacks can supplement your diet

Activity #1 GOOD NUTRITION DURING PREGNANCY
Activity #2 MENU PLANNING FOR PREGNANT WOMEN
Activity #3 HOW THE UNBORN BABY IS FED

NUTRITION DURING PREGNANCY (continued)

V. Alcohol and Pregnancy - Some Facts

A. When a pregnant mother drinks, the fetus drinks with her.

B. The fetus has no defense against alcohol.

C. The fetus can become addicted - become an alcoholic - while still in its mother's womb.

D. When the child is born and the umbilical cord is severed, the child of an alcoholic mother manifests withdrawal symptoms.

E. The newborn can be an alcoholic.

F. Years later the child's "first drink" experience instantly triggers his old addiction - an addiction that began before he was born.

G. The unborn child can be born with the birth defect characteristic, FAS (fetal alcohol syndrome).

VI. FAS - Definition

A. Fetal Alcohol Syndrome: a cluster of symptoms seen in an infant or child whose mother consumed as little as 2 drinks a day during her pregnancy; includes mental and physical retardation with facial and other body deformities.

B. FAS - some facts:
1. FAS is the most common cause of mental retardation.
2. Alcohol does the most severe damage to the fetus within the first month in the womb.
3. It is estimated that one child in 750 is born with FAS.
4. FAS is the most common birth defect in the Western World.
5. FAS can be prevented.

VII. Alcohol and the Fetus

A. Alcohol kills or slows growing cells.
1. It interferes with organ development.
2. Since the brain develops throughout pregnancy, it is the organ most affected by maternal drinking.

NUTRITION DURING PREGNANCY (continued)

B. Alcohol consumption increases the chances of spontaneous abortion, stillbirth and premature delivery, in women who drink two or more alcoholic beverages a day.

VIII. FAS and the Child

A. FAS causes low birth weight and height with no postnatal catch-up.

B. Physical abnormalities:
1. Small head circumference
2. Eyes too close together
3. Folds of skin that cover the inner corner of the eyes
4. No bridge to the nose just before the forehead
5. The small valley that extends from the bottom of the nostril septum to the upper lip is absent
6. The top lip is small and has a vermilioned border.
7. The brain is much smaller.
8. Poorly formed ears
9. Cleft lip and cleft palate
10. Small teeth with faulty enamel
11. Heart defects
12. Bone and joint abnormalities
13. Poor coordination
14. Learning impairment, often with late onset
15. Hyperactive
16. The more severe the facial characteristics, the more severe the mental impairment
17. All abnormalities caused by FAS are permanent.

XI. FAS Prevention

If you are pregnant, don't drink. If you drink heavily, don't become pregnant.

Activity #4 FETAL ALCOHOL SYNDROME

Nutrition Curriculum
Unit #9
Function #XII
Activity #1

NAME OF ACTIVITY: "GOOD NUTRITION DURING PREGNANCY"

GENERALIZATION: Drinking alcoholic beverages during pregnancy may damage the developing fetus.

OBJECTIVES: Explain the possible effect on the unborn child of excessive alcohol consumption during pregnancy.
Analyze the risks regarding the use of alcohol during the child bearing years.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
What does "eating for two" mean?
Why does a pregnant teenager need more nutrients than a pregnant adult?
What can happen to the unborn baby if the mother has poor nutrition?
What are the suggested number of daily servings from each of the basic four food groups for a pregnant teen?

EQUIPMENT: Paper, pencil, pen, lecture notes

PROCEDURES:
1. Teacher lectures from notes.
2. Students answer questions in discussion groups.

SUMMARY: Students clarify the importance of nutritional needs and the adverse affect of poor nutrition on a pregnant adult.

Nutrition Curriculum
Unit #9
Function #XII
Activity #2

NAME OF ACTIVITY: MENU PLANNING FOR PREGNANT WOMEN

GENERALIZATION: Good nutrition is vital for a healthy baby and its mother.

OBJECTIVES: Define the nutrient needs of the pregnant woman. Develop suitable menu plans for a pregnant woman.

BACKGROUND INFORMATION: Lecture notes/discussion/handout
Auxiliary texts/reference books in classroom

EQUIPMENT: Handout of daily food guide
pen/pencil/paper

PROCEDURES:

1. Divide students into 2 groups
2. Each group will develop different healthy menus for a pregnant woman in her first trimester.

   Group 1 - Diet for one week - at her home

   Group 2 - Diet for one week - on a camping trip, or on vacation (restaurant food).

3. Replace 200 kilocalories (approximately equivalent to two servings of skim milk) with alcoholic beverages.
   What nutrients will be decreased in these menus?
4. Presentation of menu by a group leader. Each student gets a copy of each menu plan.

SUMMARY: Students will become aware of the nutrient needs of expectant mothers.

Nutrition Curriculum
Unit #9
Function #XII
Activity #3

NAME OF ACTIVITY: "HOW THE UNBORN BABY IS FED"

GENERALIZATION: Drinking alcoholic beverages during pregnancy may damage the developing fetus.

OBJECTIVES: Define nutrient needs of the pregnant woman and/or the fetus.

BACKGROUND INFORMATION:

Pretest (definitions) and Unit Outline
Nutrients, oxygen, and fluids are passed through the placenta to the unborn child.
Nourishing your unborn baby starts before you become pregnant.
Within moments after you conceive you begin to nourish the baby with nutrients stored in your body.

DISCUSSION QUESTIONS: Entertain questions from the students

EQUIPMENT: Pretest, filmstrip "Inside My Mom", visual "How the Fetus is Fed".

PROCEDURES:

1. Administer Pretest "How the Unborn Baby is Fed." Have students define the following terms.
    a. womb
    b. uterus
    c. embryo
    d. fetus
    e. umbilical cord
    f. amniotic sac
    g. yolk sac
    h. placenta
    i. ovum
    j. sperm
2. Show filmstrip.
3. Distribute and explain visual "How the Fetus is Fed."
4. Discuss as a class the feeding of the unborn child.
5. Administer Pretest again to determine comprehension.

SUMMARY: Drinking alcoholic beverages during pregnancy may damage the fetus.

Nutrition Curriculum
Unit #9
Function #XII
Activity #3

"HOW THE UNBORN BABY IS FED" <Answer Sheet>

1. Womb-the uterus: a filter-transfer system for transferring nutrients from the mother's blood stream to the baby within 2 hours after she eats.

2. Uterus: small, muscular pear-shaped organ, about the size of a fist, where a fertilized egg will grow in the female.

3. Embryo: a cluster of constantly dividing cells in the first stages of development (first 8 weeks). During this time span all organs and systems of the human body are formed.

4. Fetus: the term used to identify the growing child after the first 8 weeks. The fetus is about 1" long and .07 ounces. It has all the features and organs of the body and looks like a tiny human being.

5. Umbilical cord: transportation route between baby and mother. It connects the baby to the placenta. Nutrients, oxygen, and fluids move from the mother to the placenta through the umbilical cord, and to the baby. Waste products return through it to the placenta and into mother's bloodstream.

6. Amniotic sac: the protective sac that surrounds the embryo. It is filled with a fluid that keeps the embryo moist and protects it from physical shock.

7. Yolk sac: holds a seven-day supply of nutrients for fertilized cell.

8. Placenta: the blood vessel-filled lining in the uterus. Nutrients, oxygen and fluids are passed through the placenta from the mother (see umbilical cord above).

9. Ovum: a female germ cell that has been fertilized.

10. Sperm: any of the male germ cells in the fluid semen.

Nutrition Curriculum
Unit #9
Function #XII
Activity #4

NAME OF ACTIVITY: FETAL ALCOHOL SYNDROME

GENERALIZATION: Drinking alcoholic beverages during pregnancy may damage the developing fetus.

OBJECTIVES: Describe one disease (FAS) related to excess alcohol consumption during pregnancy.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
How does the amount of alcohol consumed affect the fetus?
How can FAS be prevented?
What are the physical manifestations of FAS?

EQUIPMENT: Visuals "Signs of FAS" and "Severity of Defects"

PROCEDURES:

1. Administer Pretest "Effects of Alcohol During Pregnancy" as an Introduction to FAS.
2. Lecture to students on FAS.
3. Hand out visuals.
4. Discuss each defect associated with FAS.

SUMMARY: FAS can be prevented entirely. FAS cannot be cured.

Nutrition Curriculum
Unit #9
Function #XII
Activity #4
Post-Test

NAME ________________________ PERIOD ____________

EFFECTS OF ALCOHOL DURING PREGNANCY

Circle "T" if the statement is TRUE and "F" if the statement is FALSE.

T F 1. The fetus is affected when a pregnant woman drinks alcohol.

T F 2. Children born to mothers who drink excessively may have physical and mental defects.

T F 3. Occasional intake of alcoholic beverages has been proven safe after the third month of pregnancy.

T F 4. The brain of the unborn baby is affected by the alcohol intake of the mother.

T F 5. Heart defects in babies of alcoholic mothers are common.

T F 6. Any woman of child bearing age runs a risk of harming her unborn child by drinking alcohol.

T F 7. Children born with defects related to the alcohol intake of their mothers can usually be cured of the defects.

T F 8. The name given to an alcohol-related defect of a child is "Fetal Alcohol Syndrome".

EFFECTS OF ALCOHOL DURING PREGNANCY <Answer Sheet>

1. True. Because of the size of the baby, the effect is immediate.

2. True. Increase in stillbirths, premature babies, mental retardation, physical deformity, narrow eyes. Low nasal bridges, up-turned noses and delayed behavioral problems have been noted among children born to mothers who drink excessively during pregnancy.

3. False. No drug has been proven safe to take during pregnancy!
In the first three months, important organ development takes place, but the brain and some other organs keep developing throughout the term of gestation.

4. True. It is believed that alcohol adversely affects the baby's fast-growing tissues, either killing cells or slowing their growth. Because the brain develops throughout pregnancy, it stands to reason that it is the organ most affected.

5. True. Almost half of FAS babies have heart defects that may require heart surgery,

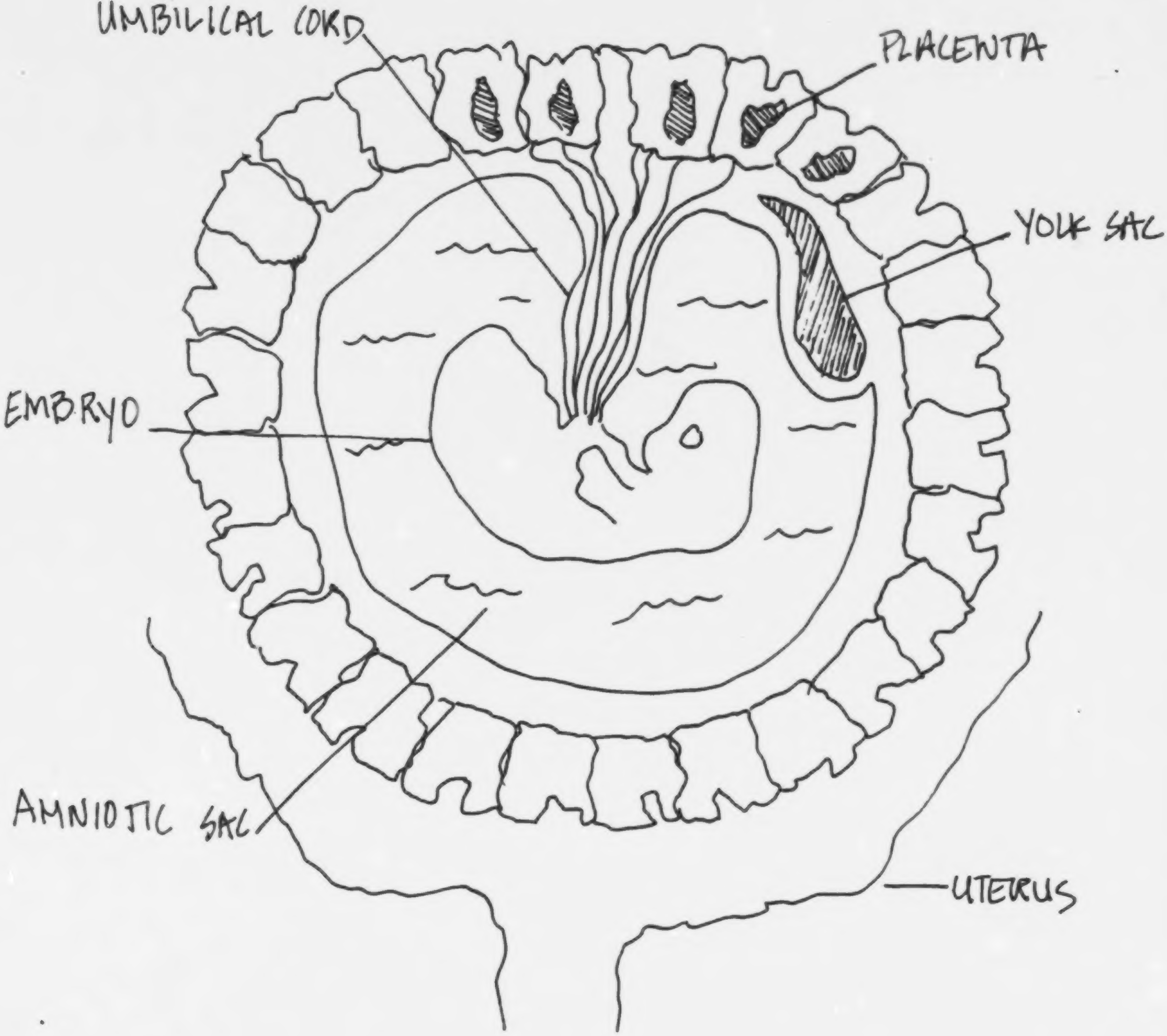
6. True. It is estimated that there are more than one million alcoholic women of childbearing age, and the number is growing, particularly among adolescents. Babies of teenagers who drink heavily are in double jeopardy. They may be born too small or too soon because their mothers' bodies cannot meet the demands of pregnancy. If they are also subjected to excessive alcohol, they may suffer symptoms of Fetal Alcohol Syndrome.

7. False. Most affected youngsters have small brains.

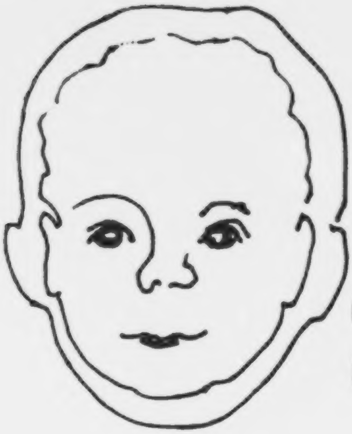
8. True.

UNIT HANDOUT AND OVERHEADS

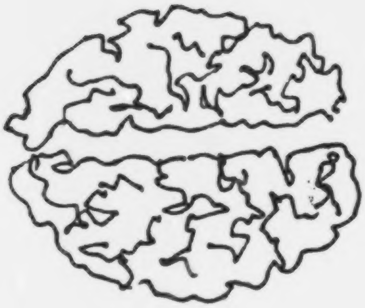
HOW THE FETUS IS FED....


UMBILICAL CORD
PLACENTA
YOLK SAC
EMBRYO
AMNIOTIC SAC
UTERUS

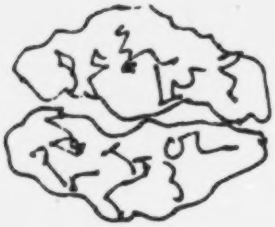
SIGNS OF FAS....



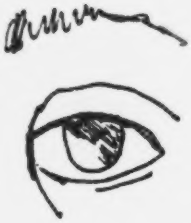
A CHARACTERISTIC FEATURE OF FAS IS A SMALLER HEAD CIRCUMFERENCE (SKETCH) THAN USUAL (OUTLINE).



BRAIN SIZE OF NORMAL NEWBORN



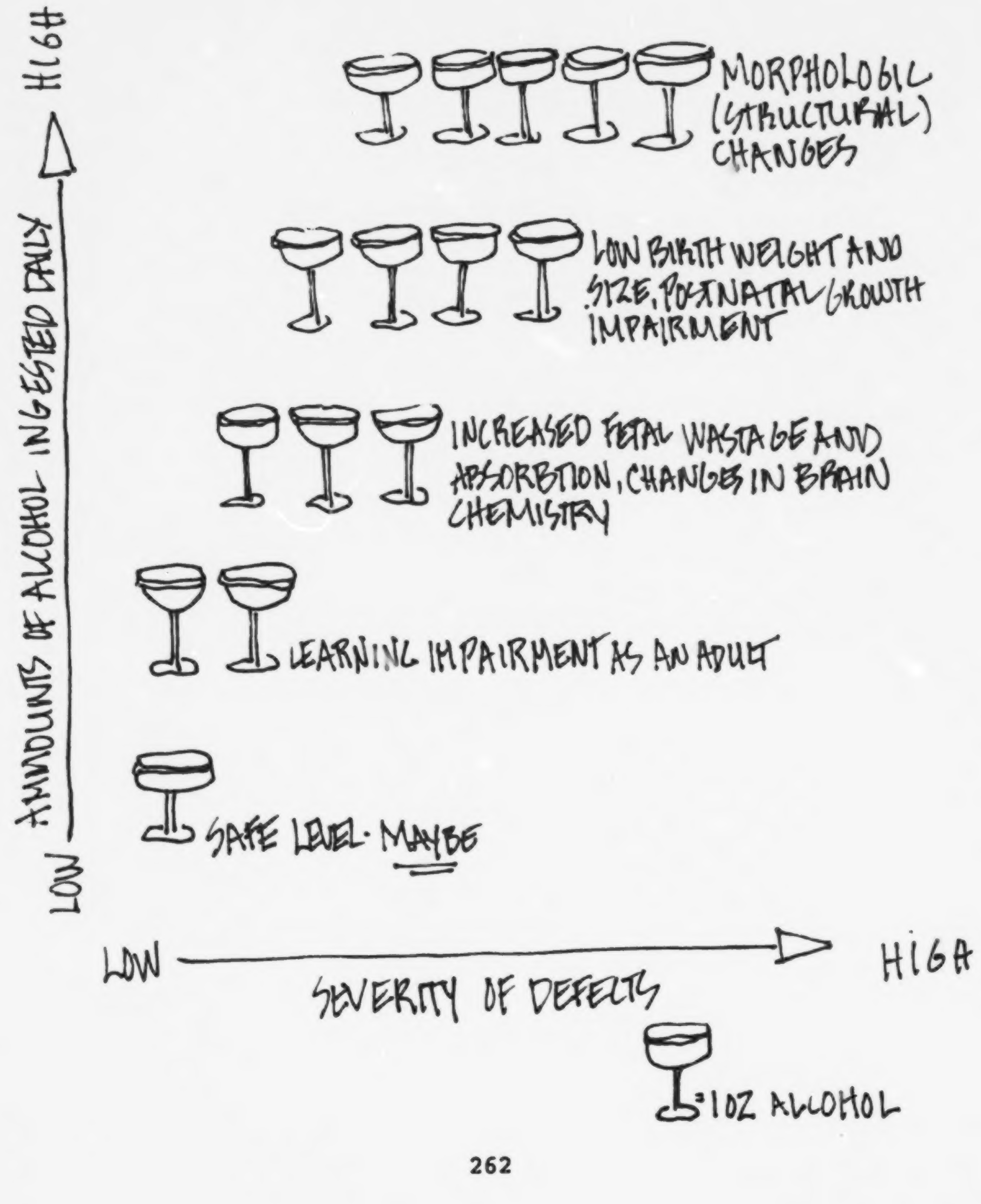
BRAIN OF INFANT BORN WITH FAS — IT DIED 5 DAYS LATER



A TELLING DEFORMITY OF FAS - THE VERTICAL FOLD OF SKIN COVERS THE INNER PORTION OF THE EYE.

FAS

#1 CAUSE OF BIRTH DEFECTS IN WESTERN WORLD



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Nutrition Curriculum
Unit 10

Maintain Desirable Weight

Nutrition Curriculum Unit Ten

<Dietary Guidelines for Americans ** Maintain Desirable Weight>

XIII. Function: Identify factors that relate to maintaining desirable weight levels.

GENERALIZATIONS:

1. Obesity is harmful to one's health and may shorten life. It increases risk of high blood pressure, diabetes, heart disease, and many other medical problems.

2. All calories count, regardless of the food they come from.

3. The best approach to maintaining a proper weight is through watching calories and exercising.

4. Fad diets are unhealthful because they are not nutritionally balanced.

5. Anorexia nervosa and bulimia are serious eating disorders.

OBJECTIVES:

The student will be able to:

A. Explain ways in which exercise, rest and good nutrition help maintain and enhance physical fitness and improve work performance.

B. Demonstrate the knowledge that caloric intake is related to caloric expenditure by selecting activities that utilize greater caloric expenditure.

C. Estimate daily kilocalorie needs based on body frame size and generalized activity patterns.

D. Record physical activity for one day.

E. Using recorded activities determine daily energy needs.

F. Make a chart of physical activity versus calorie intake, using scientific notation where appropriate.

G. Interpret graph data according to exercise level and eating habits.

H. List sources of hidden calories in the diet.

I. Compare the Dietary Guidelines and RDA with nutrients obtained from fad diets.

J. Modify menus and recipes in accordance with Dietary Guidelines.

ADDITIONAL LEARNING ACTIVITIES:

1. Using "Calorie count-down" provided, have students modify a high calorie menu.

ADDITIONAL RESOURCES:

MAINTAIN DESIRABLE WEIGHT

INTRODUCTION

Adolescence is a time of rapid physical growth, second only in rate to the prenatal-infancy period.

The nutritional needs at this time of rapid growth are tremendous. Calorie needs, as well as the body's demand for other nutrients, closely parallel the growth rate. This means that the adolescent's nutrient needs are higher in relation to body size than those of other groups.

The adolescent growth spurt generally occurs in boys between ages 12 and 17 years. In girls, it begins about two years earlier and lasts a shorter time. Besides being years of rapid growth, the adolescent years are also ones of tremendous activity.

Eating habits of teenagers may often be poor because activities keep them away from home at mealtime. Also, their eating habits are usually more influenced by their friends and by advertising than by parents.

Many teenagers skip breakfast and eat snacks that are too high in sugar and fat. Teenage girls may eat too little because they dread being fat, even if they are already underweight.

The adolescent cannot afford to fill up on foods that contribute only calories. Meals and snacks must be chosen carefully because of the greater need for all of the nutrients.

It is important that teens eat wholesome energy-containing, body-building foods. The basic food groups supply these nutrients and include the following:

*Milk and cheese - 4 servings per day to provide protein, calcium, riboflavin and other vitamins and minerals.

*Vegetables and fruits - At least 4 servings per day, including one rich source of vitamin C, such as citrus fruit or tomatoes, and one rich source of vitamin A, such as carrots, greens or cantaloupe.

*Meat, poultry, fish, and beans - 2 or more servings per day to provide protein, iron, vitamin B6, zinc, and other nutrients.

*Breads and cereals - 4 or more servings per day of whole-grain or enriched products to provide B vitamins, iron, some protein, and other nutrients.

*Fats and sweets - Use in moderation because this group provides calories with few other nutrients.

MAINTAIN DESIRABLE WEIGHT (continued)

I. Energy

Sun is the original source of all energy on the earth. Plants use the process of photosynthesis to convert solar energy to chemical energy (carbohydrates) which can be utilized by man and animals.

II. Foods which provide energy

A. Food fuels
1. Carbohydrates - provide 4 kilocalories per gram
2. Proteins - provide 4 kilocalories per gram
3. Fats and oils - provide 9 kilocalories per gram
4. Alcohol - provides 7 kilocalories per gram

B. Kilocalories are the unit measure of energy used in nutrition. Kilocalories are not a nutrient, but an attribute of a nutrient.

C. Energy Storage
Energy not used for immediate needs is stored in the body as fat or as glycogen. Only carbohydrates can contribute to the limited store of glycogen, but all three energy-providing nutrients (as well as alcohol) can contribute to our unlimited fat stores.

III. Energy Needs for Body Processes

A. Basal Metabolic Rate (BMR) -
is involuntary energy usage of heart, liver, lungs, kidneys, while the body is at rest and accounts for over one-half of total energy expenditure.
Factors which affect BMR include:
1. Thyroid, adrenal and pituitary secretions
2. Size, shape, weight, gender, age, rate of growth, body temperature
3. BMR decreases during sleep.

B. Energy usage due to physical activity
Other factors affecting energy usage:
1. Body weight (larger mass takes more energy to move)
2. Occupation (active versus sedentary)
3. Recreational pursuits
4. Age (decreased physical activity is not necessary to old age)

MAINTAIN DESIRABLE WEIGHT (continued)

The longer the duration of an activity and the greater the intensity of an activity, the greater the amount of energy is expended.

IV. Energy Balance

A. To maintain desirable weight, energy expenditure (BMR and physical activity) needs to balance with energy intake (food and beverages).
   1. If energy intake is greater than expenditure, our bodies store the excess kilocalories as fat. Weight gain occurs.
   2. If energy intake is less than expenditure, our bodies withdraw stored energy. Weight loss occurs.
   3. It takes an excess of 3500 kilocalories to produce one pound of body fat. Conversely, it takes a deficit of 3500 kilocalories to lose one pound of body fat.

B. Body weight as a guide to energy balance
   1. A constant body weight is an indication of energy balance; energy intake and expenditure are equal. Changes in body weight are an indication of changes in this balance.
   2. Day-to-day variation in water balance and water retention in the tissues (edema) can cause erroneous interpretations of the individual's energy balance.

C. Adapting Energy Balance
   1. To gain weight, eat more and exercise less.
   2. To lose weight, eat less and exercise more.
   3. The most successful weight loss or gain programs combine both dietary modifications and exercise changes.

V. Desirable Body Weight

A. Cultural determinants of desirable body weight
   1. In certain cultures obese women are considered beautiful.
   2. Large physical size is considered a sign of wealth in some societies.
   3. Parents fatten daughters in hope they will be attractive to marry into well-to-do families.
   4. English speaking countries put higher status upon tall, slender and sleek bodies.

MAINTAIN DESIRABLE WEIGHT (continued)

B. Metropolitan Life Height and Weight Tables
Provide desirable body weight for height based on three frame sizes (small, medium and large). These weight tables are derived from a population of Americans covered by life insurance who had low mortality rates.

C. Methods for determination of body fat
1. Pinch test - used to determine content of fat located directly under the skin surface. Sites most commonly measured are:
    a. Back of upper arms
    b. Waist
    c. Back of calf
    d. For men, mid-chest area
2. Mirror test - without clothes, look at yourself in the mirror. Are there bulges? Are there areas where your bones show through?

VI. Obesity and its Treatment

A. Definition
1. Overweight - 10 percent over the desirable body weight according to the individual's height and gender. Also an individual with more than 1 inch of fat in the pinch test.
2. Obesity - 30 percent over the desirable body weight, for the individual's height and gender.

B. Causes of overweight and obesity
1. Energy imbalance - either excess kilocalorie intake or insufficient energy expenditure.
2. Health problems which disrupt the energy balance.

C. Societal factors which encourage overeating
1. Food advertisements on television and radio
2. Social events - Food is associated with many occasions.
3. Eating is a pleasurable experience.
4. Food is a symbol of financial security and social status.
5. Food relieves tension, loneliness and boredom.

D. Treatment of Obesity
1. Good reasons to lose weight are for health, appearance and feelings of comfort in social situations.
2. Visit with a physician prior to starting a weight loss program.

MAINTAIN DESIRABLE WEIGHT (continued)

3. Set a reasonable goal for weight loss. Appropriate maximum weight loss per week is two pounds.
    a. Determine the desirable body weight for your age, gender, body build and activity level.
    b. Give rewards for achievement of intermediate goals (obviously not with food).
4. Change eating habits
    a. Develop eating patterns that can be used for life.
    b. Determine location and situation in which overeating occurs; develop strategies to avoid these problem situations.
    c. Do not eliminate favorite foods from diet; learn to eat them in moderation.
    d. Substitute low calorie foods for high fat and high sugar items. The following are characteristics of low calorie items:
        (1) Thin or watery - oranges, pears, grapefruits, and other fruits
        (2) Bulky - lean fish, meat and poultry
        (3) Coarse, with lots of fiber, but no fat - celery, greens and bread
        (4) Watery crisp - apples, carrots and other fruits and vegetables
        (5) Puffed or airy - enriched cereals, but not greasy
    e. Avoid high calorie foods. The following are characteristics of high calorie foods:
        (1) Thick, oily or greasy crisp - french fries and fried chicken
        (2) Slick, smooth, and thick - sauces, gravies and milk shakes
        (3) Sweet, sticky - candy, cakes, pies, cookies, syrups and carbonated beverages
        (4) Compact or concentrated - jams, stuffings for poultry
    f. Decrease butter, mayonnaise, sauce, gravy, and breading. Often, what is added to a food makes it high calorie.
5. Change physical activity patterns.
    a. Climb stairs and walk to destinations instead of using the elevator and car.
    b. Set aside time each week for physical activity.
    c. Advantages of exercise
        (1) Improves muscle tone
        (2) Gives greater feeling of well-being
        (3) Increases resting BMR over the long run

MAINTAIN DESIRABLE WEIGHT (continued)

- (4) Relieves tension and boredom which can lead to overeating
- (5) Results in new interests, meeting new people, and keeps your mind off food

6. "Miracle" Diets That Aren't
   - a. Pills - Amphetamines (Speed) are stimulants which decrease appetite. Side effects include high blood pressure, addiction, insomnia, dryness of mouth and rapid heart beat.
   - b. Diet candies (Ayds) - contain sugar and fiber which expands in the stomach as it absorbs water; can decrease appetite because of the feeling of fullness.
   - c. Formula diets - Problems associated with these liquid diets are monotony, severe constipation, nutritional imbalances.
   - d. High fat diets - Problems associated with these diets are high saturated fat content, danger of ketoacidosis, harm to fetus in pregnant women.
   - e. High protein diets - Problems associated with this diet are similar to high fat diet (particularly the risk of ketoacidosis). Also, protein foods are more costly.
   - f. Low carbohydrate diet - Problems with this diet are chronic fatigue, ketoacidosis and lack of sufficient nutrient intake.
   - g. Single food diets - These regimens come under different names. The major problem with them is that all nutrient needs are not met.

V. Underweight and its Treatment

A. Diagnosing underweight - 10 percent or more, less than desirable body weight
   1. Pinch test
   2. Mirror test

B. Problems of underweight
   1. Poorly developed muscles
   2. Poor posture
   3. Little energy reserves
   4. Lack of insulation against environmental changes, as a result more sensitive to cold
   5. Fatigues more easily

MAINTAIN DESIRABLE WEIGHT (continued)

C. Reasons for being underweight
  1. Tension and anxiety affect appetite.
  2. Medications which may decrease appetite
  3. Involvement in activities with little time for eating
  4. Excessive dieting due to fear of fat

D. To Gain Weight
  1. Increase the amount of kilocalories consumed.
  2. Increase the frequency of food consumption.
  3. Choose higher kilocalorie foods.
  4. Decrease physical activity if it is feasible.

Nutrition Curriculum
Unit #10
Function #XIII
Activity #1

NAME OF ACTIVITY: CUTTING CALORIES

GENERALIZATION: All calories count, regardless of the food they come from.

OBJECTIVES: List sources of hidden calories in the diet.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

Were the alternate food selections acceptable?
Were the costs similar? Were they higher or lower?

EQUIPMENT:

Fast Food and Beverage Calorie Counter
Calorie Countdown Sheet

PROCEDURES:

1. Have students record food eaten in one meal yesterday.
2. Have the students evaluate this meal and decrease the number of calories in that meal by 200 calories.
3. Have each student list the foods they would normally purchase at a fast food restaurant.
4. Using the Fast Food Calorie Counter, determine the number of calories in that meal.
5. Have each student make alternative selections from the same restaurant that have a lower calorie count.

SUMMARY:

Eating habits can be modified to include more healthful selections.
Fast food restaurants often offer foods that are lower in calories than the standard selections.

DEMONSTRATION FOR CUTTING CALORIES

1. Set up the foods on a table or counter in the following order:

    bread - butter - peanut butter - jelly

    salad - dressing - low-cal dressing

    coffee - sugar - half and half

2. Place calorie cards face down in front of each item.

3. Explain that the purpose of the activity is to show how "little extras" add up quickly.

4. Turn over the calorie card for the piece of bread. Then for the butter, the peanut butter and the jelly calorie cards and discuss how each addition adds calories to the sandwich. Repeat the procedure for the salad and dressing and the coffee, sugar and cream.

5. Emphasize that you are not comparing the nutrient content of the different items. You are just trying to make them aware of sources of calories.

Nutrition Curriculum
Unit #10
Function #XIII
Activity #1

FAST FOOD and BEVERAGE CALORIE COUNTER

	Calories (Kcal) per item
McDonald's	
Egg McMuffin	352
Quarter Pounder	414
w/ cheese	517
Big Mac	541
Hamburger	257
Cheeseburger	306
Chicken McNuggets	288
Filet O Fish	402
French Fries	220
Apple Pie	300
Chocolate Shake	364
Burger King	
Whopper	606
Cheeseburger	305
French Fries	214
Vanilla Shake	332
Dairy Queen	
Big Brazier Deluxe	470
Brazier Dog	273
Brazier Onion Rings	300
DQ Cone, regular	230
dipped	300
DQ Float	330
DQ Malt, regular	600
DQ Sundae, med	300
DQ Banana Split	540
Taco Bell	
Bean Burrito	343
Beef Burrito	446
Beefy Tostada	291
Taco, regular	186
Tostada, regular	179
Burrito Supreme	457
Arby's	
Roast Beef Sandwich	350
Beef/Cheese Sandwich	450
Ham/Cheese Sandwich	380
Turkey Deluxe	510
Club Sandwich	560

	Calories (Kcal) per item
Wendy's	
Single Hamburger	470
Double Hamburger	670
Triple Hamburger	850
Kentucky Fried Chicken	
Chicken Dinner	643
Extra Crisp	765
Individual Chicken Pieces:	
Drumstick	136
Thigh	276
Wing	151
Jack in the Box	
Jumbo Jack Hamburger	551
w/ cheese	628
Onion Rings	351
Break Jack Sandwich	301
Pizza Hut	
Thin `N Crispy, cheese	450
Thick `N Chewy, cheese	560
(1/2 10" pizza)	
Beverages	
12 oz Soft Drink	160
12 oz Diet Soft Drink	1
White Wine, 4 oz	80
Red Wine, 4 oz	85
Wine Cooler, 8 oz	140
Budweiser Beer, 12 oz	150
Light Beer, 12 oz	96
Michelob Beer, 12 oz	160
Natural Light Beer, 12 oz	100
Baskin-Robbins (3 1/2 oz.)	
ice cream	201
sherbet	196
yogurt	108

FAST FOODS and BEVERAGE CALORIE COUNTER
(continued)

Dunkin Donuts

Cake donut	240
Yeast raised donut	160

(Add 5-10 calories for glaze and 34-40 calories for filling and topping)

CALORIE COUNTDOWN SHEET

If you are consuming more calories than are appropriate for your size, reduce the serving size of foods rather than eliminating them from the diet. For example:

Chocolate chip cookies
4 = 200 calories
2 = 100 calories

Mashed potatoes
1 cup = 180 calories
1/2 cup = 90 calories

Gravy
2 tablespoons = 80 calories
1 tablespoon = 40 calories

Macaroni and cheese
1 cup = 430 calories
1/2 cup = 215 calories

Pork and beans
1 cup = 310 calories
1/2 cup = 155 calories

Apple pie
1/6 pie = 400 calories
1/8 pie = 240 calories

Another way to cut calories is to change the method of preparation. Decreasing amounts of margarine, vegetable oil, sugar or honey can decrease the caloric content of a food.

An example of calories added to foods would be -

1 deep fried potato, 10 french fries	= 270 calories
1 medium baked potato	= 90 calories

160 calories are added to the potato by frying.

An example of calories taken from foods would be -

1 cup whole milk, 3 1/2% butterfat	= 160 calories
1 cup skim milk, trace butterfat	= 90 calories

70 calories are removed from skim milk due to the decreased butterfat.

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CALORIE COUNTDOWN

VEGETABLE-FRUIT GROUP

lower	in between	higher
1 cup raw vegetable	3/4 cup raw vegetable	1/2 cup potato
salad without dressing (40)	salad with 1 tablespoon French dressing (95)	salad (125)
1/2 cup cooked cabbage (15)	1/2 cup coleslaw (60)	2 rolls stuffed cabbage (260)
1 medium baked potato (95)	2/3 cup prepared mashed potatoes, with milk and butter (125)	1/2 cup hash brown potatoes (170)
1 medium raw apple (80)	1 sweetened baked apple (160)	1/8 of a 9-inch apple pie (300)
1/2 cup fresh citrus sections (40)	1/2 cup jellied citrus salad (120)	1/2 cup lemon pudding (145)
1/2 cup cooked green beans (15)	1/2 cup stir-fried green beans (35)	1/2 cup green bean-mushroom casserole (70)
1/2 cup diced fresh pineapple (40)	1/2 cup canned pineapple chunks in natural juice (70)	1/2 cup canned pineapple chunks in heavy syrup (95)

BREAD-CEREAL GROUP

1 cup plain cornflakes (95)	1 cup sugar-coated corn flakes (155)	1/2 cup crunchy cereal...with nuts raisins, etc. (280)
1/2 cup steamed or boiled rice (85)	1/2 cup fried rice without meat (185)	1/2 cup rice pudding (235)
1 slice bread (55 to 70)	1 corn muffin (125)	1 Danish pastry (275)
1 cup cooked noodles (100)	6 cheese ravioli with sauce (175)	1 cup lasagna (345)

CALORIE COUNTDOWN (continued)

MILK-CHEESE GROUP

lower	in between	higher
1/2 cup (single dip) ice milk (95)	1/2 cup (single dip) ice cream (135)	1 cup vanilla milkshake (225)
1 oz Cheddar cheese (115)	1 cup cheese souffle (260)	1 cup macaroni and cheese (430)
8 fl. oz. carton plain lowfat yogurt (145)	8 fl. oz. carton vanilla flavored yogurt (195)	8 fl. oz. carton yogurt OR 2 dips frozen yogurt (225-240)

MEAT & POULTRY, FISH & BEANS GROUP

2 oz. broiled chicken (95)	1/2 fried chicken breast (2-3/4 oz) or 2 drumsticks (170)	8 oz. individual chicken pot pie (505)
3 oz. lean hamburger (without bun) (185)	3 oz. regular hamburger (without bun) (235)	3 1/2 oz. cheeseburger (without bun) (320)
3 oz. lean roast beef (205)	3 oz. Swiss steak (315)	2/3 cup beef stroganoff with noodles (525)
2-1/2 oz. broiled cod with butter or margarine	1-1/2 oz. fried breaded ocean perch (160)	2-1/2 oz. baked stuffed fish (1/2 cup bread stuffing) (325)
1/2 cup boiled navy beans (95)	1 cup navy bean soup (170)	1 cup baked navy beans (310)
3 oz. boiled shrimp (100)	3 oz. fried breaded shrimp (190)	1/2 cup shrimp Newburg (285)

CALORIE COUNTDOWN (continued)

FATS, SWEETS, ALCOHOL GROUP

lower	in between	higher
1 teaspoon sugar (15)	2 tablespoons pancake syrup (120)	12 fl. oz. cola (145)
12 fl. oz. light beer or 3-1/2 oz. dry white wine (85 to 95)	12 fl. oz. regular beer or 3-1/2 fl. oz. sweet wine (140 to 150)	Tom Collins - 1 fl. oz. gin & 6 fl. oz. Tom Collins mix (195)
3 oz. popsicle (70)	1/2 cup (single dip) sherbet (135)	1.2 oz. milk chocolate candy bar (175)

CALORIE COUNTDOWN (continued)

Compare the calories! Lose weight by substituting foods in Column I for foods in Column II

Column I	Column II
Low fat or 2% 145/cup Skim or buttermilk: 90/cup	Whole milk: 165 Kcal/cup
Miracle Whip: 60/tbl. or other salad dressing	Mayonnaise: 90/tbl.
Plain yogurt: 8/tbl.	Sour cream: 25/tbl.
Whipped topping: 16/tbl. Dream Whip	Whipped Cream: 55/tbl.
Part skim mozzarella: 70/oz.	Cheddar cheese: 115/oz.
Apple butter: 35/tbl.	Jam: 55/tbl.
Plain popcorn: 55/cup	Potato chips (10): 115
Pumpkin pie (1/8): 280 piece	Cherry pie (1/8): 360/piece
Dry cocoa: 40 per 1/4-cup (= 1 oz.)	Baking chocolate: 180/oz.
Diet soda: 1/12 fl. oz.	Cola beverage: 160/12 fl. oz.
V-8 tomato juice: 50/cup	Orange juice: 110/cup
Angel food cake: 115/2" piece	Chocolate cake: 330/2" piece
Green or wax beans: 20/ 1/2 cup	Green peas: 60/ 1/2 cup
Bacon: 95/2 slices (well cooked)	Pork sausage: 160/link
Pam: 0	Lard for frying: 125/tbl.
Beef and vegetable soup: 250/cup	Beef pot pie: 525/cup
Peach: 35/each	Banana: 100/each
Coleslaw: 60 per 1/2 cup	Potato salad: 155 per 1/2 cup
Rye, white, wheat bread: 65/slice	Cornbread: 190/2" square

CALORIE COUNTDOWN (continued)

Sour ball: 35/each	Fudge: 75/1" square
Lo-cal gelatin: 10 per 1/2 cup	Jello gelatin: 80 per 1/2 cup
Thin sliced bread: 40-50/slice	Regular slice bread: 60/slice
Broccoli: 20 per 1/2 cup	Corn: 70 per 1/2 cup

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Activity #1

EVERY LITTLE BIT ADDS UP

Extra calories the body does not need are stored up as fat. This chart tells how many days it takes to add a pound of weight by eating excess calories.

	Calories	Days to gain 1 lb.
Beer - 12 oz.	173	17
Wine - 4 oz.	85	35
Highball - 8 oz.	165	18
Cola - 12 oz.	158	18
Peanuts - 1 oz.	170	17
Pretzels (twisted) - 4	48	61
Potato chips - 10 chips	115	26
Chocolate chip cookies - 2	100	30
Brownie with nuts - 2"x2"x3/4"	146	20
Cupcake with frosting - 1	184	16
Graham cracker - 1 cracker	30	98
Butter or margarine - 1 Tbl.	100	30
Coffee - 2 cups with 1 Tbl. sugar and 1 Tbl. cream	160	18
Salad dressing - 2 Tbl.	150	20
Cereal with milk - 1 bowl	180	15
Peanut butter sandwich - 1	328	9

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Activity #1

Using Habits to Trim Your Weight

Food	How Much to Omit	How Often	Loss per Year
Butter or margarine	one pat	daily	5 pounds
Average layer cake	half of one slice	weekly	1 1/2 pounds
Breakfast ham	half a serving	weekly	2 1/2 pounds
Mashed potato	half a serving	2x weekly	2 pounds
French fries	half a serving	2x weekly	3 pounds
Medium fried bacon	2 slices	weekly	1 1/2 pounds
Ice cream soda	one	weekly	5 pounds
Saltines	2 instead of 4	2x weekly	1 pound
Whipped cream	two Tbl.	weekly	1 pound
Oil/vinegar dressing	1 Tbl. instead of 2 Tbl.	2x weekly	1 1/2 pounds
Mayonnaise	1 Tbl.	weekly	1 pound
Baking powder biscuit	one	weekly	1 1/2 pounds
Bread or toast	one slice	daily	6 pounds
Doughnut	one	weekly	2 pounds
Pie	half a slice	2x weekly	3 1/2 pounds
Jam or Jelly	one Tbl.	2x weekly	1 1/2 pounds
Scrambled eggs	one	weekly	1 1/2 pounds
Sugar	one teaspoon	daily	2 pounds
Rice	half a serving	weekly	2 pounds
Canned fruit in syrup	half a serving	2x weekly	1 1/2 pounds
Pork and beans	half a serving	weekly	2 1/2 pounds
Beer	12-ounce can	weekly	2 1/2 pounds
Carbonated drinks	8-ounce glass	weekly	1 pound
Whiskey	1 1/2 ounce glass	weekly	2 pounds
Wine	three ounces	weekly	1 pound
Most candies	one ounce	weekly	1 1/2 pounds
Most cheese	one ounce	weekly	1 1/2 pounds
Boiled or poached egg	one	weekly	1 pound
Potato chips	10 medium size	weekly	1 1/2 pounds
Bread stuffing	half a serving	weekly	1 pound

Nutrition Curriculum
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Activity #2

NAME OF ACTIVITY: CALCULATING YOUR ENERGY NEEDS

GENERALIZATIONS: The best approach to maintaining a proper weight is through watching calories and exercising.

OBJECTIVES: Estimate daily kilocalorie needs based on body frame size and generalized activity patterns.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:
Does everyone have the same caloric needs?
Will everyone who is the same height need the same number of calories?
What factors influence energy requirements?

EQUIPMENT:
Frame Size Chart
Calculation of Energy Needs worksheet
Desirable weight chart (Metropolitan Life Chart)
Tape measures (one for every two students)
Calorie expenditure by activity sheet

PROCEDURES:

1. Have each student guess their frame size.
2. Hand out a Frame Size Chart and tape measure to every two students.
3. Explain how the measurement is taken and converted into centimeters (inches x 2.54).
4. Convert each person's height into centimeters.
5. Divide height by the wrist circumference. frame size.
7. Hand out an Energy Needs Worksheet to each person.
8. Input the correct data in the appropriate spaces.
9. Have the students compare their activity levels with those presented in the Activity Sheet to determine if their levels are Sedentary, Moderate or Strenuous.
10. Have the students compare their weights with those presented on the Desirable Weight Chart.
11. Discuss ways to increase activity.
12. Follow-up questions:
    Did you predict your frame size?
    Does your weight fall within the guidelines?

Nutrition Curriculum
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Activity #2

FRAME SIZE CHART

Calculate the r value using the following formula:

$$r = \frac{\text{height (in centimeters)}}{\text{wrist circumference (in centimeters)}}$$

	r value	frame size
MALES	10.4 or greater	small
	9.6 to 10.4	medium
	9.6 or less	large
FEMALES	11.0 or greater	small
	10.1 to 11.0	medium
	10.1 or less	large

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Activity #2

CALCULATION OF ENERGY NEEDS

Desirable Body Weight

1. Female - 100 pounds for the first 5 feet of height plus 5 pounds for each additional inch - Medium Frame.
2. Male - 106 pounds for the first 5 feet of height plus 6 pounds for each additional inch - Medium Frame.

for Small Frame - Subtract 10%
for Large Frame - Add 10%

Caloric Needs

A. Basal Calories (Desirable Body Weight x 10) __________
B. Activity Calories (choose one)
Sedentary (Desirable body weight x 3)
Moderate (Desirable body weight x 5)
Strenuous (Desirable body weight x 10) __________
C. Subtotal (add A + B) __________
D. Correction for weight loss (Subtract 500 kcal/day) __________
E. Total Caloric Need (C - D) __________

Classification of Activities

SEDENTARY
- Doing homework
- Eating
- Listening to the radio
- Other sitting types of activity that are not
- Playing cards
- Sewing
- Sitting in class
- Watching T.V.

MODERATE
- Activities done while standing
- Dishwashing
- Making beds
- Mopping
- Personal care
- Preparing food
- Walking
- Gardening

STRENUOUS
- Basketball
- Bicycling (13 mph)
- Cheerleading
- Cross-country skiing
- Dancing, fast
- Football
- Running (7 mph)
- Skiing
- Swimming
- Tennis

Nutrition Curriculum
Unit #10
Function #XIII
Activity #3

NAME OF ACTIVITY: RECORDING PHYSICAL ACTIVITY

GENERALIZATION: The best approach to maintaining a proper weight is through watching calories and exercising.

OBJECTIVES: Record physical activity for one day. Using recorded activities, determine daily energy needs.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

If you ran 1 mile a day for 3 days, how many calories would you use?
How many pounds would you lose if you did this for 30 days?
What are some activities you could include to increase the number of calories used?

EQUIPMENT:

24-Hour Activity Record
Calorie/Activity Chart

PROCEDURES:

1. Hand out the 24-Hour Activity Records.
2. Instruct each student to write down each activity for one whole day in 15-, 30-, 45-, or 60-minute blocks of time.
3. Calculate the number of calories expended for each activity.
4. Compare this figure with the amount of calories consumed.
5. Have each student determine if they are eating too much, too little, or the appropriate amount of calories to maintain their current weight.

SUMMARY: Energy requirements depend on individual activity levels and basal metabolic rates. Weight remains constant when calories consumed are equal to calories needed for daily energy requirements.

Nutrition Curriculum
Unit #10
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Activity #3

24-HOUR ACTIVITY RECORD

Time	Activity	Minutes Spent	Calories Used

Total Calories Used per Pound_______

Total Calorie Output = ___________ (Cal. per pound) x __________ (Wt. in pounds) = __________calories

Nutrition Curriculum
Unit #10
Function #XIII
Activity #3

CALORIE EXPENDITURE BY ACTIVITY

This table shows the number of calories burned per pound of body weight. To calculate your energy expenditures, multiply the appropriate figure on the chart by your body weight in pounds. If you spent more or less time in any activity, you will need to adjust your calculations as shown in the example.

* * *

EXAMPLE:

You weigh 100 pounds and spent 30 minutes doing class work:
(0.3 calories/pound) x 100 pounds = 30 calories

Your friend, weight 100 pounds, spent 15 minutes doing class work:
(0.3 calories/pound / 2) x 100 pounds = 15 calories

* * *

Calories Burned per Pound*

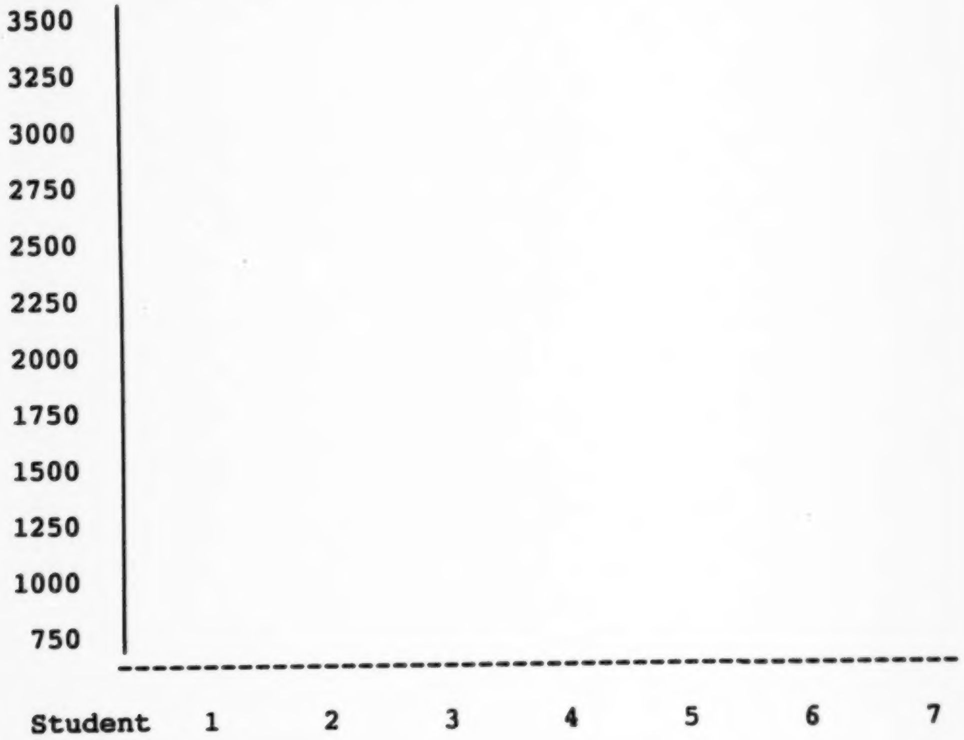
Daily Activities	30 min	Sports Activities	30 min
Car Repairs	0.8	Archery	1.0
Class Work	0.3	Badminton,Volleyball	1.1
Dancing	1.0	Baseball	1.0
Dressing or showering	0.6	Basketball	1.4
Driving	0.6	Bicycling	1.6
Eating	0.3	Bowling	1.3
Housework	0.8	Football	1.7
Mowing Grass	0.8	Golf	1.1
Resting in bed	0.2	Horseback Riding	1.4
Sleeping	0.2	Ping Pong	0.8
Standing (no activity)	0.3	Running (6 mph)	2.5
Standing (lt activity)	0.5	Skiing	1.9
Talking	0.4	Soccer	1.8
Walking (3 mph)	1.0	Swimming	1.4
Walking downstairs	1.3	Tennis	1.9
Walking upstairs	3.4	Wrestling	2.6
Watching TV	0.2		
Writing	1.0		

* Figures include calories spent for basal metabolism and digestion of food.

Nutrition Curriculum
Unit #10
Function #XIII
Activity #4

NAME OF ACTIVITY:	GRAPHING PHYSICAL ACTIVITY AND CALORIE INTAKE
GENERALIZATION:	The best approach to maintaining a proper weight is through watching calories and exercising.
OBJECTIVES:	Make a chart of physical activity versus calorie intake, using scientific notation where appropriate. Interpret graph data according to exercise level and eating habits.
BACKGROUND INFORMATION:	Refer to Unit Outline. Balancing calorie consumption with calorie expenditure results in maintenance of body weight. Most individuals are capable of maintaining body weight without consciously controlling either component of this balance equation.
DISCUSSION QUESTIONS:	How does your caloric intake compare with your usage of calories for physical activity? Are you in energy balance? What is the logical consequence of continuing your present eating and physical activity patterns?
EQUIPMENT:	Worksheet: Unit 2 Food Diary Recording Physical Activity Unit 10, Activity #3 Graph Paper
PROCEDURES:	1. On blackboard record daily calorie intake and energy expended in physical activity for each student. 2. Have students graph calorie consumption and physical activity for each student. Graph calorie consumption from lowest to highest (i.e. student #1 should have the lowest calorie consumption).
SUMMARY:	Using graphing techniques can illustrate visually the relationship between calories consumed and calories expended.

Graph of physical activity and calorie intake, using scientific notation where appropriate.



Plot calories consumed in red.
Plot calories expended through exercise in black.
Color the space between the two lines red if more calories were consumed than expended.
Color the space between the two lines blue if more calories were expended than consumed.

Nutrition Curriculum
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Activity #5

NAME OF ACTIVITY: FAD DIETS

GENERALIZATION: Fad diets are unhealthy because they are not nutritionally balanced.

OBJECTIVES: Compare the Dietary Guidelines and RDA with nutrients obtained from fad diets. Modify menus and recipes in accordance with Dietary Guidelines.

BACKGROUND INFORMATION: Refer to Unit Outline.

DISCUSSION QUESTIONS:

How much weight does this diet promise the dieter will lose?
Is the diet nutritionally balanced?

EQUIPMENT:

Fad diets
Basic 4 food groups chart

PROCEDURES:

1. Find a fad diet in the newspaper, current magazine or from a friend.
2. In light of what you have learned in nutrition class, evaluate the fad diet according to the following questions.
    a. Name of diet.
    b. Describe the diet briefly.
    c. How much weight does this diet promise the dieter will lose?
    d. What nutrients does this diet lack?
    e. Does it provide a variety of well-liked foods?
3. Follow-up questions:
   Is this diet nutritionally balanced?
   Will this diet teach new eating habits?
   How much will this diet cost?
   Can one continue to follow this diet, with modifications, after losing the desired weight?
   What modifications in the fad diet would correspond to recommendations in the Dietary Guidelines and RDA?

FAD DIETS (continued)

SUMMARY: Most fad diets are not nutritionally sound. Comparison with dietary guidelines can provide an analysis of missing nutrients.

MAINTAIN PROPER WEIGHT QUIZ

Multiple Choice: Select the best answer for each statement and write the letter in the blank to the left of the number.

______1. Undesirable eating habits
  a. can keep you from losing weight.
  b. should be an important part of your daily meals.
  c. seldom present a problem when it comes to losing weight.

______2. The most important part of a weight loss diet is
  a. the desire to lose weight.
  b. skipping meals.
  c. following a fad diet found in a current magazine.

______3. People who are overweight may
  a. have a better chance of getting a major disease such as heart disease, diabetes, etc.
  b. develop bone problems because of the extra weight the bone structure must carry.
  c. both of the above.

______4. You can maintain proper weight by
  a. skipping meals and eating only when you are hungry.
  b. eating enough food to supply your body's energy needs for the day.
  c. exercising only on days when you eat a lot.

______5. You can add calories to food by
  a. frying it.
  b. serving it with rich sugary food such as jam or sauce.
  c. both of the above.

______6. People gain weight because
  a. they eat exactly the amount of food they should.
  b. they eat more food energy or calorie than their bodies need.
  c. they exercise too much.

______7. Diet or dietetic foods
  a. are the only way to lose weight.
  b. are made for people on special diets.
  c. are difficult to find in grocery stores.

______8. Weight control is emphasized in the United States because
  a. the slender look is a part of today's lifestyle.
  b. thin people are always happy.
  c. industry wants to make money on exercise equipment and diet pills.

MAINTAIN PROPER WEIGHT QUIZ (continued)

_____9. The method of telling whether or not you are overweight is to
  a. make the pinch test.
  b. run up a flight of stairs and see if you run out of breath.
  c. bend over and try to touch your toes with your fingers without bending your knees.

____10. If you increase your activity while dieting
  a. you won't have time to study.
  b. you'll be too tired to eat.
  c. you'll lose more weight than you would otherwise.

True or False

Read the statement and determine if the statement is true (+) or false (O).

_______11. Obesity is due entirely to heredity.

_______12. Skipping meals is a good way to lose weight.

_______13. You can eat all you want and still lose weight if you take reducing pills.

_______14. One must not drink water when trying to lose weight.

_______15. No fat should be consumed when on a diet.

_______16. Sugar is not as fattening as starch.

_______17. Fruits and high-protein foods have no calories.

_______18. Walking an extra mile a day will result in a one-pound weight loss each week.

_______19. It is not wise to exercise very much while trying to lose weight. This is because exercise tends to make you overeat.

_______20. When trying to lose weight, you should lose at least four pounds per week.

_______21. Some calories are more fattening than others.

MAINTAIN PROPER WEIGHT QUIZ (continued)

______22. When counting calories, you don't have to worry about the size of the serving.

______23. BMR is the speed at which the body uses energy for its basic processes.

______24. Everyone has the same BMR.

______25. Today's lifestyles make it easy for people to lose weight.

______26. Sedentary activities are those that take the largest amount of activity.

______27. Empty calories are foods that give energy, but few, if any, nutrients.

______28. The amount of energy a food can supply the body is measured in grams.

______29. High-calorie foods have the largest number of calories.

______30. When you balance energy, the number of calories you eat during the day equals the number of calories you use for BMR and activities.

MAINTAIN PROPER WEIGHT QUIZ <Answer Sheet>

__A__ 1. Undesirable eating habits
- a. can keep you from losing weight.
- b. should be an important part of your daily meals.
- c. seldom present a problem when it comes to losing weight.

__A__ 2. The most important part of a weight loss diet is
- a. the desire to lose weight.
- b. skipping meals.
- c. following a fad diet found in a current magazine.

__C__ 3. People who are overweight may
- a. have a better chance of getting a major disease such as heart disease, diabetes, etc.
- b. develop bone problems because of the extra weight the bone structure must carry.
- c. both of the above.

__B__ 4. You can maintain proper weight by
- a. skipping meals and eating only when you are hungry.
- b. eating enough food to supply your body's energy needs for the day.
- c. exercising only on days when you eat a lot.

__C__ 5. You can add calories to food by
- a. frying it.
- b. serving it with rich sugary food such as jam or sauce.
- c. both of the above.

__B__ 6. People gain weight because
- a. they eat exactly the amount of food they should.
- b. they eat more food energy or calorie than their bodies need.
- c. they exercise too much.

__B__ 7. Diet or dietetic foods
- a. are the only way to lose weight.
- b. are made for people on special diets.
- c. are difficult to find in grocery stores.

__A__ 8. Weight control is emphasized in the United States because
- a. the slender look is a part of today's lifestyle.
- b. thin people are always happy.
- c. industry wants to make money on exercise equipment and diet pills.

MAINTAIN PROPER WEIGHT QUIZ (continued)

__A__ 9. The method of telling whether or not you are overweight is to
- a. make the pinch test.
- b. run up a flight of stairs and see if you run out of breath.
- c. bend over and try to touch your toes with your fingers without bending your knees.

__C__ 10. If you increase your activity while dieting
- a. you won't have time to study.
- b. you'll be too tired to eat.
- c. you'll lose more weight than you would otherwise.

True or False

Read the statement and determine if the statement is true (+) or false (O).

__O__ 11. Obesity is due entirely to heredity.

__O__ 12. Skipping meals is a good way to lose weight.

__O__ 13. You can eat all you want and still lose weight if you take reducing pills.

__O__ 14. One must not drink water when trying to lose weight.

__O__ 15. No fat should be consumed when on a diet.

__O__ 16. Sugar is not as fattening as starch.

__O__ 17. Fruits and high-protein foods have no calories.

__O__ 18. Walking an extra mile a day will result in a one-pound weight loss each week.

__O__ 19. It is not wise to exercise very much while trying to lose weight. This is because exercise tends to make you overeat.

__O__ 20. When trying to lose weight, you should lose at least four pounds per week.

__O__ 21. Some calories are more fattening than others.

MAINTAIN PROPER WEIGHT QUIZ (continued)

O 22. When counting calories, you don't have to worry about the size of the serving.

+ 23. BMR is the speed at which the body uses energy for its basic processes.

O 24. Everyone has the same BMR.

O 25. Today's lifestyles make it easy for people to lose weight.

O 26. Sedentary activities are those that take the largest amount of activity.

+ 27. Empty calories are foods that give energy, but few, if any, nutrients.

O 28. The amount of energy a food can supply the body is measured in grams.

+ 29. High-calorie foods have the largest number of calories.

+ 30. When you balance energy, the number of calories you eat during the day equals the number of calories you use for BMR and activities.

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